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Swedish University of Agricultural Sciences

Department of Economics

# Urban agriculture

## - experiences from the Swedish horticulture

*Erik Gullers*



*Photo taken by Erik Gullers 2014*

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## **Urban agriculture - experiences from the Swedish horticulture**

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## Summary

Urbanisation has increased the distance between the urban and the rural. Urban agriculture can be a solution to overcome that distance. The characteristic of urban agriculture is the intensive production in intra urban and peri-urban areas. Until 1950s food production in cities was an important part of the urban economy and the urban food supply. Since the 1950s the urban located production of food has almost ceased in Sweden, partly as a result of cheap food imports. The main drawbacks of food imports are contribution of greenhouse gas emissions. In contrast urban agriculture results in the following positive effects;

- Shorter transports and decreased need of transports – as a result less emissions
- Cities that are more energy efficient and therefore more sustainable
- Money is spent locally which benefits the local economy
- Gives employment

The positive impacts urban agriculture has on a society is the main reason why the thesis is examining the economic factors influencing Swedish urban agriculture. There is also done an examination of the economic advantages, - disadvantages and –constraints for Swedish urban agriculture. This is done through a case study of production of vegetables in the Swedish cities Stockholm and Malmö. The case study is relying on conducted interviews persons involved in horticultural sector in Stockholm and Malmö. Von Thünen’s model of the economic geography of agriculture is used as a theoretical framework for the study. The model consists of critical economic factors, which are profits, bid rents and transportation costs. The findings from the study’s results are the following;

### *Key economic factors influencing Swedish urban agriculture:*

- Profitability
- Perishability and quality of food products
- Demand for local food products
- Distance to urban markets
- Competition and bid rents
- Land tenure

### *Economic advantages:*

- Focus on intensive production of high value types of vegetables close to urban markets gives high returns and allows urban farmers to pay high bid rents
- Multiple businesses and alternative business models offer an alternative for urban agriculture and it enables urban farms to pay higher bid rents
- Closeness to consumers allows urban producers to adapt to local consumer demands in cities

### *Economic disadvantages:*

- Fierce competition from other producers
- Competition of urban land from other land uses

### *Economic constraints:*

- Limited access to land
- Municipal governments are restrictive with renting out urban land

## Sammanfattning

Urbanisering har ökat avståndet mellan stad och land. Stadsodling kan vara en möjlig lösning för att minska detta gap. Det som kännetecknar stadsodling är intensiv produktion på begränsade ytor i städer eller i utkanten av städer. Fram till 1950-talet har livsmedelsproduktion i städer haft stor betydelse för städernas ekonomi och städernas försörjning av livsmedel. Efter 1950-talet har livsmedelsproduktionen i städer nästan helt försvunnit i Sverige. Detta har delvis berott på möjligheter till billig livsmedelsimport av bl. a. grönsaker. De främsta nackdelarna med livsmedelsimport är stora utsläpp av växthusgaser. Stadsodling har däremot flera fördelar gentemot importerad livsmedel för samhället;

- Bidrar till kortare transporter och generellt sätt minskat behov av transporter – leder till mindre utsläpp av växthusgaser
- Bidrar till att göra städer mer energieffektiva och därför mer hållbara
- Gynnar den lokala ekonomin eftersom konsumenterna spenderar sina pengar lokalt
- Ger nya arbetstillfällen

De positiva effekterna som stadsodling har på samhället är huvudanledningen till varför det har valts att fokusera på vilka ekonomiska faktorer som påverkar svensk stadsodling. Det utreds också vilka ekonomiska fördelar, -nackdelar och – begränsningar som finns för svensk stadsodling. Dessa frågeställningar utreds genom en fallstudie av produktion av grönsaker i städerna Stockholm och Malmö. Fallstudien baseras på genomförda intervjuer av personer som är involverade inom den svenska trädgårdsnäringen. Von Thürens modell av ekonomisk geografi för jordbruk används som teoretiskt ramverk för studien. Modellen består av ekonomiska faktorer såsom vinster, budgivningsräntor och transportkostnader. Studiens resultat är följande:

*Viktiga ekonomiska faktorer som påverkar svensk stadsodling:*

- Hållbarhet och kvalitet på livsmedelsprodukter
- Efterfråga på lokalproducerad mat
- Konkurrens och budgivningsarrenden
- Markarrenden

*Ekonomiska fördelar för svensk stadsodling:*

- Fokus på intensiv produktion av högt prissatta typer av grönsaker nära stadskärnor ger hög avkastning och möjliggör för stadsodlare att betala höga budgivningsarrenden
- Spridd affärsverksamhet och alternativa affärsmodeller erbjuder ett alternativ för stadsodling och gör att stadsodlare kan betala höga budgivningsarrenden
- Närhet till konsumenterna från städer gör att stadsodlare lätt kan anpassa sig till en lokal efterfrågan

*Ekonomiska nackdelar:*

- Svår konkurrens från andra producenter- främst från utländska producenter
- Konkurrens från andra aktörer som vill använda odlingsmarken för andra syften

*Ekonomiska begränsningar:*

- Begränsad tillgång på mark i städer
- Kommunerna är restriktiva med att arrendera ut mark

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## 1. Introduction

In one Swedish business magazine for students there is mentioned that many history students in Uppsala had difficulty to understand basic agricultural terms such as “sowing” and “ploughing” (DI Young, 2014). Whether this can describe how far the urbanisation has gone remains an open question. What is true is however that the knowledge about how food is produced is decreasing when food is being produced further away from the consumers as a result of the urbanisation (Viljonen et al., 2005). Urban agriculture means food production close to urban consumers.

There are many different ways to define what urban agriculture is. One way to define it is to compare it with rural agriculture (Mougeot, 2000). The main differences between them are in matters of scale and location. Urban agriculture is usually in smaller scale and located within the city borders (intra-urban) or just outside it in the urban fringe (peri-urban). Mougeot (2000, p.10) proposes a definition of urban agriculture as *“an industry located within (intra-urban) or on the fringe (peri-urban) of a town, an urban centre, a city or metropolis, which grows or raises, processes and distributes a diversity of food and non-food products, reusing mainly human and material resources, products and services found in and around that urban area, and in turn supplying human and material resources, products and services largely to that urban area”*

### 1.1 Problem background

Urban agriculture is not a new phenomenon, even if it has got a renewed interest in recent times (Björklund, 2010; Barthel & Isendahl, 2012). In the old Maya, Aztec and Byzantine cities urban agriculture was an integrated part of the urban societies (Berg & Rydén, 2012; Barthel & Isendahl, 2012; Isendahl & Smith, 2012). In these cities urban agriculture was lasting for a millennium. Urban agriculture provided food security, particularly during times of bad harvests from the rural agriculture. The urban agriculture was also a part of the urban zoning and through intensive production forms it provided food in large quantities (Isendahl & Smith, 2012). This means that urban agriculture has been a geographical widespread phenomenon throughout the history.

In Sweden urban agriculture has existed since medieval times and it has been important for the urban economy and for the urban supply of food (Björklund, 2010). Swedish towns had a high level of self-sufficiency of food before 1900. Another driver of urban agriculture was that many citizens needed extra incomes, because their professions didn't give enough incomes. However, there were very few urban citizens that actually had access to urban farm land. The urban farm land that existed was given access to urban citizens through donations from the royal Swedish administration. Usually, the donations were a result of a demand from urban citizens of getting more farm land and pasture. These donations were given to the urban citizens during hundreds of years. Donations of farm land meant that the urban citizens had the land to disposal; the ownership of the land was still at the royal Swedish administration.

Urban agriculture went from being conducted in small scale to develop into a larger commercial scale from the 17<sup>th</sup> century to the 19<sup>th</sup> century (Björklund, 2010). The most intensive agricultural products were grown closest to the town centres, meanwhile the sizes of the urban farms varied. There can't be said whether there is any connection between the size of the towns and the amount of available farm land. In the 17<sup>th</sup> and 18<sup>th</sup> centuries the self-sufficiency of the cities was high, but it lowered during the 19<sup>th</sup> century. During 19<sup>th</sup> century

the urban agriculture went from smaller scale agriculture for urban self-sufficiency to commercial scale urban agriculture. It was the reason to why the urban agriculture stopped being conducted by urban citizens. Instead it was commercial scale rural farmers who took over the production and it also meant that larger areas became cultivated. The motives behind that development can be found in the model from von Thünen. It says that the production is forced to be intensive at locations that are closer to urban centres. Better communications decreased however the extent of urban agriculture in the end of the 19<sup>th</sup> century. It's here important to state it was primary the wheat production that decreased in the cities.

Until the 1950s in Nordic countries the agricultural production grew inwards towards the city centers and along railway lines (Berg & Rydén, 2012). Better communications in the end of the 19<sup>th</sup> century made it possible to freight fertilizer to farms, which enabled a flourishing horticulture in Stockholm (Pers. with, Würtz, 2014). The fast transports and closeness to the market meant that agricultural supplies from the cities could be transported to the market gardens in western part of Stockholm. It also made it possible to freight perishable vegetables fast to the market. The increase of demand on vegetables during the first half of the 20<sup>th</sup> century was the primal driver of a rapid extension of horticultural production. Fertilizer from human waste and good communications made it possible to utilize that demand. In the beginning of the 20<sup>th</sup> century there were none who thought whether the urban close horticulture could be defined as urban agriculture or not.

After the 1940s the society started to change and Sweden experienced a rapid urbanisation and there became a worldwide improvement of freight capabilities of perishable crops like vegetables (Grotewold, 1959; Berg & Rydén, 2012). It meant that vegetables could be imported from faraway countries to Sweden. Rapid mechanisation of the agriculture led to larger farms and fewer small scale farms. Today the production of vegetables is almost non-existent in urban areas in Sweden (Pers. with, Würtz, 2014). The market gardens in Stockholm have almost vanished; partly as a result of competition from cheap imported vegetables and other horticultural products.

The cheap import of vegetables is however contributing to large greenhouse gas emissions (Viljonen et al, 2005). Road freights are causing considerable amounts of greenhouse gas emissions (Chapman, 2007). Food freights stand for a large share of the total road freights (Pearson et al., 2010). But oversea-shipping is also contributing to large amount of greenhouse gas emissions (Chapman, 2007). Most of the food freight goes to cities where most people lives. This also means that modern cities are largely dependent on supplies from the outside (Hewitt & Hagan 2001). Modern cities are not particularly energy efficient, which means that they are not using the energy in an efficient way. If the society ought to handle the climate threat and reduce its emissions a change is needed in the urban planning and in the urban development (Viljonen et al, 2005).

## **1.2 Problem**

The climate threat can be tackled by enhancing social and ecological values at local level; urban agriculture can be a part of that solution (Tighta et al 2005; Viljonen et al., 2005). Urban agriculture means local production and distribution of food (Mougeot, 2000; Viljonen et al, 2005; Specht et al., 2013). Through urban agriculture local resources can be utilised and urban agriculture makes cities more energy efficient. It contributes to preserving biodiversity, tackling waste and the amounts of energy used to produce and distribute food. In cities there are surpluses of energy and waste that for instance can be utilised in urban food production. This creates industrial symbioses and closed circulations. Modern urban agriculture is

therefore sustainable and contributes to lower the cities' negative environment impacts. Urban agriculture can also contribute to food security and it makes cities more self-sufficient on food (Despommier, 2011). Mok et al (2013) ask the question whether the need for production of food near cities outweigh the need for housing and industrial operations.

A clear characteristic of urban agriculture is the short geographical distance to urban centres (Mougeot, 2000; Viljonen et al, 2005). This decreases the need for transports and makes it possible for urban farmers to adapt to local demands. The advantages of a decreased need for transports are reduction of greenhouse gas emissions and energy requirements for the whole value chain (Viljonen et al., 2005; Pearson et al., 2010). One German study found for example that regional production and distribution of fruits gave 24-33% less energy requirements than over-sea imported fruits from South Africa and New Zealand (Blanke, 2008). Decreased transport costs are another consequence when the need for transports decreases. Transport costs at global over-sea level have been relatively low and constant in general over the last two decades (Korinek & Sourdin, 2009; Wilmsmeier & Sanchez, 2009). For regional and local transports such as road freight the fuel prices have tripled since 1980 in Sweden (www, Swedish petroleum and biofuels institute, 2014).

In a review of 38 Swedish studies about urban agriculture it can be deduced that few of them are given attention to the economic aspects of urban agriculture in Sweden (*see appendix 2*). This study provides an economic perspective on urban agriculture in Sweden by evaluating economic aspects such as economic geography, market structure, ecological economics, location, land use economics and regulatory. The study is therefore a necessary contribution to the knowledge about urban agriculture in Sweden. It has relevancy for practitioners, researchers and decision makers. In the strife for exploring economic aspects of urban agriculture there is questioned what are the economic factors influencing urban located production of vegetables in Stockholm and Malmö. It is also given attention the economic advantages,-disadvantages and -constraints for urban located production of vegetables in Sweden.

### **1.3 Aim and Delimitations**

The aim of this thesis is to investigate economic factors influencing urban agriculture by examining urban agriculture in Stockholm and Malmö with an explorative approach. The types of the examined economic factors are delimited to economic geography, market structure, ecological economics, location, and land use economics and regulatory. The economic factors are evaluated through a focus on the economic advantages,- disadvantages and -constraints of urban agriculture. Therefore the following research questions are to be evaluated;

RQ 1 What are the economic factors influencing Swedish urban agriculture?

RQ 2 What are the economic advantages, - disadvantages and -constraints for Swedish urban agriculture?

All kinds of commercial agriculture are included in this study and the major focus is on vegetable production in Stockholm and Malmö. This study is delimited to urban agriculture in Stockholm and in Malmö. The used definition of urban agriculture is from Mougeot (2000) which includes both intra urban and peri-urban agriculture. It is vegetable production that is in the main focus of this study. However there are different types of production methods for

producing vegetables in cities, which can vary from free-land cultivations and greenhouses to vertical farms. For this study there has been chosen to include all production forms within urban agriculture, such as vertical farms, free-land cultivations and roof-top gardening. Vertical farms are a kind of a greenhouse. A city can be divided into different parts and all contains different kinds of urban agriculture (UNDP, 1996). The size of the different parts of the cities is determined by transport distances and transport efficiency. Below there is shown a table of the different types of urban farms and their location in a city (*see table 1*).

**Table 1,** The decomposed city with the locations of different kinds of urban agriculture (UNDP, 1996; p. 97)

<b>Part of the city</b>	<b>Urban characteristics</b>	<b>Types of urban agriculture</b>
Core	High population and building intensity	balcony, plants on walls, rooftops and public parks
Corridor	High density corridors with high density - houses along railway lines and highways	pollutant resistant crops, horticulture, green houses, market gardening
Wedges	Low density urban development (detached houses etc)	permanent agriculture (on slopes etc.)
Periphery	Urban fringe or peri-urban area surrounding the city	small-and medium sized farms

Urban agriculture can be both a business and a cultivation form for own consumption (UNDP, 1996). It can be difficult to see the border between the production for sale and production for own consumption. It's therefore private and corporate businesses specialised in urban agriculture that are of interest here. Urban agriculture as whole is here defined as an own industry.

The theoretical framework is delimited to von Thünen's framework. It shows how location of production is related to transport distances and local land rent. Von Thünen's model explains urban-close production as a function of transport costs and bid rents (Anderson, 2012). Here there must be stated that Von Thünen's model explains the agro-industrial geography at local and regional level, not at global level. The data sources are interviewees from Stockholm and Malmö. They have backgrounds in the horticulture and the food sector in Sweden and they all have knowledge about urban agriculture. It's important to emphasise that this study bases its empirical material from the existing horticulture in Sweden.

## 2. Method

The method chapter gives an explicit presentation of the disposition of the study, the methodology, the selection of theory and literature, the empirical background and the empirical data collection. The sections and subsections can be divided into two groups. One group explains what is done in the study and how it's done. The other group answers the question why the presented methods have been chosen.

### 2.1 Outline

The proposed disposition consists of introduction chapter (chapter 1), method chapter (chapter 2), literature review (chapter 3), theoretic framework (chapter 4), empirical background (chapter 5), empiric (chapter 6), analysis and discussion (chapter 7), conclusions (chapter 8).

The introduction chapter shall capture the reader's interest and give a reason why the study is done and the purpose with it (Robson, 2011). In chapter 2 there is given an explanation of this study's methodology. Followed by chapter 3, a literature review is presented to examine what has been published in the corresponding area to the raised research question in the study. The theoretic framework in chapter 4 is used to put the empirical data in a comprehensive academic context. In chapter 5 there is given brief empirical background to the data collected. The empiric chapter 6 consists of the data collected from interviews. In chapter 7 there is an analysis and discussion about this study's empirical results, the theory and the literature. Finally, there is a conclusion of this study's results in chapter 8.

### 2.2 Methodology

This study is a qualitative study, which means that it aims to gather a large amount of data from a few sources (Vogt, 2005; Robson, 2011). Here the qualitative approach is chosen because the intentions are to study specific exemplifying cases. The data from the study cases is collected from personal interviews. Many previous Swedish works about urban agriculture has used a qualitative approach (*see Appendix 2*). Urban agriculture is something local and non-uniform, which makes a qualitative approach more suitable than a quantitative (Viljonen et al., 2005).

For this study there is used a deductive logic. Deductive logic means that a pre-set theory is tested on the reality (Vogt, 2005; Robson, 2011). The reason to why a deductive logic is used is because of the choice of relying on a theoretical proposition as a main strategy for doing the analysis (*see section 2.5.4*). The theoretical proposition has its main base in the model of von Thünen and the model is the hypothesis for this study (*see chapter 4*). Urban agriculture is relatively new academic field of study, which is also confirmed by the fact most of the published works about urban agriculture in Sweden is from 2008 and onwards (*see Appendix 2*). Regarding the economic aspect of urban agriculture there is little published in Sweden (*ibid*). It is the reason to the choice of explorative research questions of "what-character", which means that this study is an explorative study (Robson, 2011). In section 2.5.4 the explorative approach will be further explained in how it processed the empirical data (*see section 2.5.4*).

### 2.3 Selection of theoretical framework

Von Thünen's model has been chosen because it focuses on urban-close agriculture and it explains the economic motivations for placing certain agricultural production close to urban centres (Anderson, 2012). A clear characteristic of urban agriculture is its central location close to city centres (Mougeot, 2000). In this study there is an investigation of what economic factors influencing urban agriculture. Von Thünen's model is this study's hypothesis which is used to find the economic factors influencing urban agriculture.

The model from von Thünen is based upon empirical observations during the 19th century, which were perfectly corresponded to the reality at time (Grotewold, 1959). Until recent times Von Thünen's model has been greatly influential and is the foundation of the major part of the theories about economic location and land use (Griffin, 1973; Jones et al, 1978; Nerlove et al, 1991; Parr, 2013). It has also been a tool for urban, regional analysis and agricultural economic analysis (Anderson 2012; Parr, 2013). Von Thünen's model might be old, but it is still applicable for explaining the location of agricultural production (Björklund, 2010; Aoyama et al, 2012).

There could have been used more models for examining urban agriculture. Von Thünen's model is a grounded theory that can explain several types of economic factors for agriculture at local level (Anderson 2012; Parr, 2013). However, most of the other theories about local specific economic factors for urban agriculture have their origin in Von Thünen's model (Griffin, 1973; Jones et al, 1978; Nerlove et al, 1991; Parr, 2013). Therefore von Thünen's model is solely used as a theoretical framework for this study.

### 2.4 Selection of literature

Most of the literature has been acquired through searches in various internet databases. Some of the literature consists of books borrowed from university libraries. Regarding the journal-based articles and publications the used databases are the following; SLU-library database *Primo*, *google scholar*, the SLU-publication database *Epsilon* and internal publication databases from KTH (Royal Institute of Technology), Uppsala University and Stockholm University. The journal-based articles have been found via links to article databases such as *Science Direct.com*, *SAGE journals*, *Jstore.org* *Web of knowledge.com*, *Taylor & Francis online*, *Wiley and Scopus.com*. A major part of the examined articles have been found in the following journals: *Journal of Rural Studies*, *British food journal*, *Renewable Agriculture and Food Systems*, *Journal of Urban economics*, *Land use policy*.

The aim of this study is to investigate the economic factors influencing urban agriculture by focusing on the economic advantages and disadvantages and the economic constraints of it. This research aim has been derived from literature about urban agriculture (UNDP, 1996, Viljonen et al., 2005; Pearson et al., 2010; Mok et al., 2013). The first step in the literature search process was to search for articles about urban agriculture. Usually the searches was done by using the following key words in different combinations; *urban agriculture* and *urban farming*, *urban farming*, *urban*, *urban land use*, *economics*. Thereafter the conducted search were programmed to only find articles with the following words; *urban agriculture*, *business*, *industry clusters*, *developed countries*, *economics and business*. Mougeot (2000)'s article about urban agriculture was the article about urban agriculture with far most citations. The cited articles were carefully evaluated and reviewed. Some of these evaluated and reviewed articles were selected for this study.

The evaluation of the articles was based on several factors. The major attention was given to the articles with far most citations and to related articles with many citations. A second step in the selection of articles was the identification of keywords. Articles were selected for further investigation if they contained urban agriculture, Von Thünen, urban land use, agriculture among the key words. Thereafter a careful reading of the abstract was done to identify the whether articles were relevant. Important subjects in the articles' abstract part concerned urban agriculture and any of the following topics; economic geography, market structure, ecological economics, location, and land use economics and regulatory. The last step in the evaluation of the articles was to look upon the articles methodology and conclusions.

Urban agriculture is a cross-science subject; both when it's approached in academic literature and when it's practiced on field (UNDP, 1996, Viljonen et al., 2005; Mok et al., 2013). There are two books about urban agriculture that give good attention to the economic aspect of urban agriculture; "*Urban agriculture – Food, Jobs and Sustainable cities*" by UNDP (1996) and "*CPULs – Continuous productive urban landscapes*" by Viljonen et al (2005). These books are a foundation of the literature review and are revealing the major economic motives for urban agriculture.

Urban agriculture has many different production systems and types and a major part of the literature focuses on specific kinds of urban agriculture (Mok et al., 2013). Here there has been chosen to include all types of urban agriculture to create a comprehensive picture of urban agriculture. The same thing is done in the works of UNDP (1996), Viljonen et al (2005) and Mok et al (2013). The economic factors influencing urban agriculture are still the same regardless production system (Mok et al., 2013; Specht et al., 2013). Some economic factors are particularly important for certain kinds of urban agriculture. Therefore it has been a selection of literature that states examples of different types of urban agriculture that produces vegetables (Mazerueeuw, 2005; Pearson et al., 2010; Despommier, 2011; Whittinghill & Rowe, 2011; Specht et al., 2013). The examples show different economic factors influencing urban agriculture.

Two clearly identified types of economic factors in the literature influencing urban agriculture is land use and land use economics (Mougeot, 2000; Mok et al., 2013). The literature about location and land use economics have both been taken from literature about urban agriculture and about urban economics (UNDP, 1996; Capozza & Helsey, 1989; Plantinga et al., 2002; Cavailhès & Wavresky, 2003; Zasada, 2011; Specht et al., 2013). Lack of land for urban agriculture is an economic constraint and it's therefore given a review of articles about urban land use. Regulatory is another identified type of constraint and there is review of articles about *urban agriculture and regulatory* (see chapter 3). The literature about regulatory are taken from journals about land use policy and city planning (Kaufman & Bailkey, 2000; Viljonen et al, 2005; Zasada, 2011; Thibert, 2012; Huang & Drescher, 2014). Lastly, the choice of literature about industrial clusters is motivated by Porter (1998) who states that industrial clusters are an important type of economic geographic factor for agriculture in general.

## **2.5 Empirical study**

The empirical study can be divided into several parts; empirical background, empirical data collection, limitation and validity of chosen methods and credibility and advantages of chosen methods.

### **2.5.1 Selection of empirical background**

The empirical background chapter is given by the example of the former horticulture in the western part of Stockholm and of some regulatory affecting urban agriculture. The former market gardens of Hässelby suburb provide a suitable background to this study's aim. It's well documented in the books *Sju handelsträdgårdar i Hässelby – artiklar publicerade i Hässelby hembygdsblad åren 2004-2008* by Johnsson (2008) and *BLAND BLOMSTERKUNGLAR OCH VÄXTHUS – Trädgårdsepoken i Hässelby* by Johnsson (2011). This study bases its empirical background upon the two previously mentioned books. Some supplementary information has been obtained through a personal mail correspondence with the author of the previously mentioned books about Hässelby. The regulatory part is given a brief introduction to urban planning, Swedish land use laws and types of contracts for urban agriculture.

### **2.5.2 Empirical data collection**

This study is a qualitative study which is using interviews as main source of empirical data. The data has been collected by conducting telephone interviews and personal interviews. In order to obtain the information needed from the interviews fully-structured interviews are used. Fully-structured interviews means a pre-set of carefully selected questions are asked to the respondents (Robson, 2011).

In this study there have been conducted 7 interviews. The interviews have been conducted through personal meetings and telephone interviews. All interviews were between 30-60 minutes long and were conducted by a pre-set of questions that were sent in beforehand to the interviewees (*see Appendix 1*). Regarding the selecting criteria of the interviewees they have been chosen after research on internet and through recommendations of persons within the horticultural business in Sweden.

### **2.5.3 Presentation of the interviewees**

Here there is given a short presentation of each of the interviewees and their backgrounds. It also includes the organisations that they are representing.

#### *Göran Larsson, Odlå i Stan*

Odlå i stan is an organisation that facilitates and coordinates urban agriculture in Malmö and helps property owners and settlers to start up cultivations around Malmö (Pers. with, Larsson, 2014). It's based upon cooperation with the municipality of Malmö, property owners and Odlå i Stan. Göran himself is a coordinator at Odlå i Stan. The initiated projects usually don't have any commercial thought behind, although they have plans to start up urban cultivations in commercial scale.

#### *Jenny Nilsson, Dammstorps handelsträdgård AB*

Dammstorps handelsträdgård is a market garden that produces ornamentals and apples (Pers. with, Nilsson, 2014). The market-garden has three employees and has been a family business through generations back in time. Jenny Nilsson is a gardener from the 3rd generation who is running the market garden Dammstorps handelsträdgård together with Jörgen Nilsson.



*Maria Varnauskas, Business Sweden*

Maria Varnauskas is a manager in business development at Business Sweden with the profile area food. Business Sweden is a facilitator for Swedish companies that wants to grow abroad and for foreign companies that want to invest in Sweden (www, Business Sweden, 2014). The organisation is a merger of former Swedish trade council and Invest Sweden.

*Håkan Sandin, Tillväxt Trädgård*

Håkan Sandin is a project manager at the collaborative project Tillväxt Trädgård. Tillväxt Trädgård is a collaborative project between university and the industry within the Swedish horticulture (www, Tillväxt Trädgård, 2014). The main purpose with the project is to achieve economic growth for the horticulture in Sweden.

*Gunnar Würtz, former Solbackens handelsträdgård AB*

Gunnar Würtz was the CEO for the market garden Solbackens handelsträdgård during 30 years. Solbackens handelsträdgård is a market garden that was located in Hässelby in western part of Stockholm. Their main business was horticulture and to act like wholesalers. Solbackens Handelsträdgård quit their production in 2008 and quit their business as wholesalers in 2010.

*Kjell Elander, Bondens egna Marknad*

Kjell is one of the founders of the farmers' market Bondens egna marknad, which has existed for 14 years (Pers. with, Elander, 2014). He is describing himself as an ornamental cultivator and a person who is very interested in small scale agricultural production. Bondens egna marknad is unique of its kind in Sweden, because it's the only big market platform for small scale farmers and food producers. The concept is simple; the producers sell their products directly to the consumers during weekly arranged markets in cities. Since Bondens egna marknad started in Södermalm in Stockholm it has spread over the whole country of Sweden. Kjell is particularly active in the farmers' market held at the district of Södermalm in Stockholm.

*Bo Rappne, Slotträdgården i Ulriksdal*

Bo Rappne is the CEO for Slotträdgården i Ulriksdal, which is a company within horticulture with 52 employees in Stockholm (Pers. with, Rappne, 2014). The company is a joint-stock company which is owned by Bo himself and it has existed in its current form since 1985. It has a many different businesses which involves greenhouse cultivations and free-land cultivations of flowers and vegetables, one farm shop/garden center, restaurant/café, conference and banquet hall and consulting within garden design.

To summarise the information about the interviewees and their backgrounds it has been chosen to conclude that information into a table (*see table 2*). Table 2 shows the interviewees and their backgrounds.

**Table 2,** The interviewees and their backgrounds

#### Telephone interviews

<i>Organisation</i>	<i>Person</i>	<i>Title</i>	<i>Date</i>
Odlå i Stan	Göran Larsson	Cultivation coordinator	2014-05-06
Dammstortps handelsträdgård AB	Jenny Nilsson	Gardener	2014-05-09
Tillväxt Trädgård	Håkan Sandin	Project Manager	2014-05-16
Bondens egna Marknad	Kjell Elander	Co-founder	2014-05-26

#### Personal meetings

<i>Organisation</i>	<i>Person</i>	<i>Title</i>	<i>Date</i>
Business Sweden	Maria Varnauskas	Manager	2014-05-14
former Solbackens handelsträdgård AB	Gunnar Würtz	Former CEO	2014-05-23
Slottsträdgården i Ulriksdal	Bo Rappne	CEO	2014-07-10

#### 2.5.4 Analysis of the empirical data

This study is a case study and it has affected the analysis of the empirical data. There are different strategies for analysing empirical data from a case study. The most preferable strategy is to rely on a theoretical proposition (Yin, 2009). The theoretical proposition is supposed to be grounded in studied academic theory. It shall have shaped the objectives and the design of the case study. This includes shaping of the data collection plan and give priorities to the data collection plan.

Robson (2011) describes the features of qualitative data analysis as giving labels, reflections and trying to find patterns in the data. Common aims in a qualitative analysis are to find patterns in the material (Robson, 2011). To overcome the problem of overloading of empirical data the empirical data is strictly categorised and labelled. The preferable approach to analyse the data is thematic coding analysis for this study. This depends on the fact that a deductive logic is used and that the analysis strategy relies on a theoretical proposition. In thematic coding analysis the coded data can be derived from a review of the data, research questions, previous research or theory. Coded data is data that is identified as data representing something of potential interest. If the study used an inductive logic it would have been preferred to use a grounded theory approach, which aims to develop a theory grounded in the data.

#### 2.5.5 Limitations and validity of chosen method

There are risks in relying on interviews, because they are dependent on a working co-operation with the respondent (Robson, 2011). It's crucial to have a clear communication from the beginning and make sure that the respondent well-aware of the intentions with the interview. Ethics and respect for the respondent are therefore important. Personal interviews

are also time-consuming. There are risks that some of the intended interview objects are busy and that some will pull out from cooperation when they know that the interview will last more than half-an hour. However, the time aspect hasn't been an issue for the conducted interviews in this study. In this study the telephone interviews and the personal meetings have lasted for 30-60 min.

Looked upon the interviews themselves it's a crucial question what kind of information that needs to be obtained, facts are for example easier to obtain than attitudes and beliefs (Robson, 2011). Eagerness for certain results can lead to leading questions, which are not particularly objective. Still, they need to be straightforward in order to not confuse the respondent. A successful interview is dependent on social skills and strict preparations for obtaining information of high empiric value. This study has avoided leading question by having well-prepared interview questions to the respondents. It has also has made it possible to obtain empirical data of high quality.

In the analysis of the results from the interviews there is a need of being careful with generalising. It's clear stated in the research questions that the intentions with the study are to show how the reality can be (*see chapter 1, section 1.4*). Regarding the analysis of the data, obtained from the interviewed persons in a structured interview, requires that the analysis already has been taken to consideration when creating the pre-set questions (Robson, 2011). For this study the analysis were taken in consideration when the interview questions were prepared.

#### **2.5.6 Credibility and the advantages of chosen methods**

There are little existing statistics of the urban agriculture from Statistics Sweden and the Swedish Agency of Agriculture about urban agriculture. There are statistics of the horticultural production in Sweden, but the statistics aren't delimited geographically to urban areas (Statistics Sweden, 2013). A wider national survey and investigation is needed in order to attain a full picture of the commercial value of urban agriculture in Sweden. For this research project the time resources are limited. This makes a conduction of researching specific cases most appropriate given the project's limitations. Interviews have been chosen in order to research specific cases and to obtain soft data. Urban agriculture is a new academic field of study, which makes qualitative data collection appropriate (Mok et al., 2013). Most previous Swedish studies about urban agriculture are also using interviews as main source of data collection (*see table Appendix 2*).

Robson (2011) points out that performance of personal interviews has a good potential to provide rich and illuminating data. Face to face interviews transfers high amounts of information (Robson, 2011). Telephone interviews give less information than face-to face interviews due to their shorter duration, lack of possibility of obtaining contextual information and lack of possibility of using visual means. Contextual information refers to for example the place where the company is located and its neighbourhoods. On the other hand telephone interviews are less time requiring. They are an alternative when it's not possible to meet the interviewee personally, which has been the case in this study. Telephone interviews can still give a fair amount of qualitative data if they are preceded right. The fully-structured interview puts higher demands of preparation, but it makes it easier to get the information wanted if it's performed in a proper way. For this study an adequate preparation of the questions to the interviewees has been conducted.

### **3. Literature review**

The literature review presents the results of other studies. The examined areas related to urban agriculture are economic motives for urban agriculture, business models, local food, industrial clusters, land use economics and urban land use and regulatory.

#### **3.1 General economic motives for urban agriculture**

Urbanisation is an ongoing phenomenon and urban agriculture has several types of arguments for. One estimation shows that 2/3 of the earth's population will live in cities 2030 (Viljonen et al, 2005). Food production in cities can have social, economic and environmental arguments (Mougeot, 2000; Viljonen et al, 2005). The environment arguments are that urban agriculture contributes to preserving biodiversity, tackling waste and the amounts of energy used to produce and distribute food. Urban agriculture tends to use organic production methods and sell their products locally (Viljonen et al, 2005).

According to UNDP (1996) there are 3 types of economic aspects of urban agriculture; employment/income generation/enterprise generation, national agriculture sector and land use economics. Urban agriculture gives employment, incomes and generates new enterprises (UNDP, 1996; Mougeot, 2000; Whittinghill & Rowe, 2011). Food is a low risk sector with a stable demand and closeness to market reduces storage and transport costs. It also makes it possible for enterprises to adapt to local demands. It can be stated that urban agriculture provides a clear benefit for the local economy when money is spent locally (Viljonen et al, 2005). Urban agricultural firms produce lower quantities but have larger profit margins compare to rural agriculture (Viljonen et al, 2005; Mougeot, 2000). From a global economic perspective the reasons for participating in urban agriculture has been food scarcity, economic crisis and unemployment. For the national agriculture sector the food produced in urban areas can stand for a considerable part of the total agricultural production and contributes to food security (UNDP, 1996). The third economic aspect is land use economics, which refers to utilisation of land resources.

One important issue in the area of urban agriculture is the utilization of local resources. Modern cities are dependent on supplies from the outside world to work at all (Hewitt & Hagan 2001). Within this issue there is a matter of ecological footprints, which is the land required to feed cities, supply it with timber products and land with vegetation to reabsorb carbon emissions. In London that amount of land was 125 times higher than its actual space 2001 (Hewitt & Hagan 2001). Another way of putting it is that it requires around 1.2 ha of farmland per person to feed a person (Viljonen et al, 2005). If cities ought to become sustainable they are required to be more energy efficient (Hewitt & Hagan 2001). The cities are also producing externalities as heat, which can be used to drive greenhouses. Urban agriculture can utilise local resources such as waste heat and urban waste in the production (Viljonen et al, 2005).

Urban farmers tend to distribute their products direct to the consumers, which means the production and distribution is integrated (Mougeot, 2000). As a result there is a reduction of the number of intermediaries (Viljonen et al., 2005). Reduction of intermediaries means shorter transports, which is contrary to the supermarkets big supply chain networks. The bigger supermarkets are dependent of economies of scale and they therefore need to trade in large quantities. Within the urban agriculture the quantity produced is lower and the sale therefore tends to be local. Economies of scale can be reached in the urban agriculture when

production is vertically integrated with processing, marketing and distribution (Mougeot, 2000).

Urban agriculture decreases the need for polluting transports (Viljonen et al., 2005). Urban agricultural firms offer a bigger variety of crops and vegetables compare to the supermarkets. The supermarkets require a constant flow of products to provide the same vegetables all year around. As a result there appears a need for imported food products, usually products that have been freighted long way. It's common that the same types of vegetables are exported as the imported vegetables. It leads to an increased amount of greenhouse gases and higher transport costs. Today food transports accounts for a large share of all road freight (Pearson et al., 2010). Urban agriculture decreases the need for transportation of food and contributes to shorter transports (Viljonen et al., 2005; Mendes et al., 2008; Pearson et al., 2010). It also enables local distribution (Viljonen et al., 2005).

### **3.2 Business models and production forms for urban agriculture**

There are several types of production forms of urban agriculture, which all vary in scale and ownership types (Pearson et al., 2010). Pearson et al (2010) do a categorisation of urban agriculture in scale, types and ownership. For commercial urban agriculture there exists two scales; micro and macro scale (*ibid*). Micro scale commercial urban agriculture is roof-top gardens, walls and courtyards. Macro scale urban agriculture consists of commercial scale farms, nurseries and greenhouses. The ownership of these kinds of agricultures can be private or corporate. Corporate means that there are several shareholders that own the cultivation. Private refers to a single individual that owns the cultivation.

It's the macro and micro level urban agriculture that has the biggest potential to reach the market with its products (Pearson et al., 2010). Micro and macro level urban agriculture has the potential of leading the development of new enterprises and offers value-adding activities such as food markets, marketing and supply chain activities. Urban agriculture can provide different kinds of values. These values can social, aesthetic, health, and community-building and empowerment (Kaufman & Bailkey, 2000).

In the literature there are different examples of urban agricultural forms with different benefits. One study focuses on roof-top gardening, community gardening and backyard gardens (Mazerueeuw, 2005). It states that these production forms have several advantages. Roof-top gardening, community gardening and backyard gardens can boost tourism and lead to local economic development (Mazerueeuw, 2005; Whittinghill & Rowe, 2011). Gardens attract businesses and residents, which stimulates commercial growth. Rooftops- gardens are reducing costs for heating and cooling of buildings through providing isolation. They can also prevent building from cracking roof-tops and save repair costs for buildings.

Specht et al (2013) chose to include all production forms that don't require much farm land and call this group of farms *zero acre farms*. It involves vertical farming, rooftops gardens and green wall cultivations and indoor green houses in buildings (*ibid*). Researchers and practitioners are searching for larger scale urban food production in buildings in high density area as a result of decreasing amount of fertile land in cities. Vertical farms are a new production form that is under development and can be described as greenhouses stacked on each other (Despommier, 2011). Together these greenhouses create skyscrapers. This is a highly intensive production form. Just like roof-tops gardens vertical farms don't require so

much space and can compensate the loss of agricultural land. Some production systems within vertical farms can reach enough intensity to be able to compete with soil-grown produce.

The biggest business opportunities in zero acre farming are found by integrating it with the architecture, except for the value of the production itself (Specht et al., 2013). Zero acre farms are recycling resources and links food production with buildings. Resources are especially derived from synergies between agriculture and buildings. These resources consists of human waste, waste water, waste heating and organic waste. The zero acre farms are integrated with buildings and are therefore not requiring particularly much urban land. This make them to a competitive land use in relation to soil-required urban agriculture. There are however challenges for zero acre farms. At the moment there is a need of further development of new technology and of new cultivation forms. The main problem with zero-acre farms is high investment costs and lack of acceptance for soil-less growing techniques.

Most of the urban agriculture is however found in the peri –urban part of the city (UNDP, 1996). Zasada (2011) writes that peri-urban agriculture is heterogenic. According to him peri-urban areas usually consist of farms that have an intensive and specialized production or have a low intensive production meant for hobby and recreation (*ibid*). Today consumers demand multiple functions and values from farmers. Peri-urban farmers can meet these demands through delivering local food, providing educational and recreational services.

### **3.3 Local grown food and urban agriculture**

The output from urban agriculture can be defined as local food if it's sold within an urban area or a municipality, which is usually the case for products from urban agriculture (Mougevot, 2000; Viljonen et al., 2005). In one Swedish study it was found that consumers have the perception that local foods have superior quality in relation to non-local food (Ekelund & Tjärnemo, 2009). Consumer motivations for buying local foods are taste and freshness, willingness to support the local community, concerns about origin, sustainability concerns (Visser et al, 2013). The consumers also perceive that local foods are healthy and authentic. Looked upon the economic geographical motivations for buying local grown food there are a couple of factors that are of importance. Environmental concern among consumers have a tendency to favour purchases of locally grown foods (Schneider & Francis, 2005; Thilmany, et al., 2008). Another factor that has a positive impact for the intentions to buy locally produced food is the consumers' willingness to support the local agriculture. Urban consumers are more willing to buy local produced food than rural consumers (Weatherell, et al., 2003). For urban agriculture this provides a business opportunity (Viljonen et al., 2005)

There is however an issue concerning the use of the term “local”, because the term can be problematic due to the fact that it can mean different things for different people (Ilbery & Maye, 2005; Ilbery & Maye, 2006; Blake, et al., 2010). Ilbery & Maye (2005) consider that the term local is incorrectly conflated with the terms “quality”, “alternative” and “sustainable”. Instead they consider that these are not necessarily related with each other, specialty food does not necessarily need to be produced in a sustainable way for example. Population density in a county can also affect the definition of local produced food. In general it's a combination of actors along the value chain that is trying to define for themselves what “locally produce” is, such as producers, vendors and consumers (Ilbery & Maye, 2006; Blake, et al., 2010; Dunne, et al., 2010). “Locally produce” can vary from being food produced in a country to food that is produced within a community or municipality.

### **3.4 Industrial clusters**

Urban agriculture is facing a fierce competition from abroad and industrial clusters can be one way of responding to the increased competition (Viljonen et al., 2005; Matopoulos, 2005). This is a result of a globalisation. Industrial clusters have a big importance for national, regional and metropolitan economies (Porter, 2000; Brasier et al, 2007). They consist of firms and businesses closely located to each other. Porter (2000) states that industrial clusters are concentrations of highly specialised skill and knowledge, institutions, rivals, related business, and sophisticated customers in a particular nation or region.

Other characteristics of industrial clusters are that the firms or businesses both compete and cooperate with each other (Brasier et al, 2007). The purpose with the cooperation is to enhance both technical skills and market access. Together the firms work to respond to market needs and societal demands and they also share common inputs such as labour. Location specific knowledge is something that the firms are benefiting mutually from. Still, the firms are competing on the same market.

Industrial clusters have several benefits (Porter, 2000, Brasier et al, 2007). A clear benefit of industrial clusters is low transportation costs due to closeness to markets and closeness to suppliers. The concentration of the different actors can lead to higher productivity and higher skills among the workers. Within the cluster there is spreading of knowledge and there is also a constant knowledge exchange between the actors. Industrial clusters also lead to employment growth and a spreading of the risks. However the costs of pursuing clusters may be higher than the benefits.

Porter (1998) gives an example of an agro-industrial wine cluster in California and how it is working. In that cluster there are plenty of grapes producers, wineries and supporting industries (Porter, 1998). The supporting businesses both support the wineries and the grape producers and consist of barrel makers, manufactures of irrigation and harvest equipment, advertising firms. Local institutions such as a university provide the cluster with new knowledge. There are also linkages to restaurants, the tourism industry and other agricultural clusters.

### **3.5 Land use economics and urban land use**

Urbanisation and exploitation of land have major relevance for urban agriculture because its economic conditions are complete relying on the access of land (UNDP, 1996; Mougeot, 2000; Viljonen, et al, 2005; Mok et al., 2013; Specht et al., 2013). There are usually several different stakeholders that want to use urban land. A major constraint for the urban agriculture is the limited amount of available land for farming. Conventional rural agriculture has economies of scale, which means that the machines are getting used more efficiently if they are used on a bigger area. In urban agriculture the available land for farming is much smaller and it's usually used for horticultural production. This usually means high intensive production on little space (Mok et al., 2013).

Opportunity costs have major relevancy for urban agriculture and they can hinder implementation of urban agriculture (Viljonen et al, 2005). The opportunity costs for urban land use are the revenue the land owner could earn earned if another type of land use was chosen (Plantinga et al., 2002; Brealy et al, 2013). In urban areas these alternative land uses are housing, offices, shopping areas and industries. In cities the opportunity costs can be high due to high rents and big attraction values. The opportunity costs are increasing the value of urban agricultural land in cities (Capozza & Helsey, 1989; Plantinga et al., 2002; Cavailhès &

Wavresky, 2003). Urban agriculture has usually bigger margins than rural agriculture, but the opportunity costs are also much higher in urban areas than in rural areas (Mougeot, 2000; Mok et al., 2013).

In peri-urban areas there is a constant pressure for converting agricultural land for urban development (Specht et al., 2013). Non-built up land has been exclusively been used at the cost of farm land (Zasada, 2011). There are strong financial motives for peri-urban farmers to sell land for urban development, because the price of agricultural land rises dramatically when it gets permit to be built upon (Specht et al., 2013). The land rents are increasing with the closeness to urban centres (Kellerman, 1978). Land prices in urban fringe are facing market speculations and agricultural land prices in urban areas are connected to housing rents (Specht et al., 2013). It is the actor that pays the highest bid-rent that determines the land usage (Muto, 2006). For instance it's the use of urban land for residential housing that gives the highest bid-rents in the urban periphery (Alonso, 1964).

However another opinion is that it's the legality of land tenure instead of the availability of land that is the main issue for urban agriculture (UNDP, 1996). Urban agriculture can be the highest productive use of land on vacant and degraded land sites (Pearson et al., 2010). There are many unused spaces in the cities that can be used for urban agriculture, such as slopes and wetlands (UNDP, 1996). Public institutional buildings possess many areas of land that could be transformed into productive land. Churches and hospitals usually have many open areas that could be rented out to urban farmers and provide an extra income for the institutions. Horticulture in the outskirts of cities can be competitive land use and many production forms require little land use, according to UNDP (1996). Urban agriculture is a competitive land use when used solely for agriculture. When it's practiced on land as a second use of land (hospitals, airports) the opportunity cost for using that space is much lower than the economic rent (*ibid*). Multiple land uses that include urban agriculture are increasing the total possible rent from the land area.

### **3.6 Regulatory and urban agriculture**

There are several stakeholders in urban agriculture, but it is the municipal government who has the most roles (UNDP, 1996; Huang & Drescher, 2014). The possible roles for stakeholders are regulating, facilitating, providing and partnering urban agriculture. Other stakeholders are private firms, citizens, non-governmental organisations, academic and research institutions, public governments. It means that the municipal government has a big importance for urban agricultural firms. Land use policies are important for the success of local food systems and they are also important for shaping the future of local communities. However, Thibert (2012) considers that role of the municipal governments shall be to enable urban agriculture rather than leading the development of it.

Planners and municipal governments can eliminate regulatory barriers to enhance commercial urban agriculture (Huang & Drescher, 2014). Policies, regulations and zoning laws can hinder implementations of local initiatives of urban agriculture. There are several ways that municipal governments can enhance urban agriculture. They can integrate urban agriculture into zoning laws and encourage the use of vacant public and private lands for urban farmers (Thibert, 2012; Huang & Drescher, 2014). Another aspect is the possibility to combine urban agriculture with other types of land use, such as recreation and nature conservation (UNDP, 1996; Huang & Drescher, 2014). Municipal governments can include urban agriculture in



new urban development, identify sites for urban agriculture, give leasing agreements and permit urban agriculture on roof-tops of new buildings.

A study of Canadian cities shows that urban agriculture has started to become a part of updated official policy plans among urban municipal governments (Huanga & Drescher, 2014). Some of the municipal governments in the study focused on specific forms of urban agriculture; meanwhile others had a more general approach to urban agriculture. There is a lack of mentioning of urban agriculture in the zoning-laws among most municipal governments in the studied cities. Municipal planning policy culture can be blamed for not including urban agriculture (Thibert, 2012). Public interest and advocacy for urban agriculture can however greatly influence the planning policy and the interest for urban agriculture among local governments (Huanga & Drescher, 2014). The current trend is therefore that urban agriculture is getting higher priority in the city planning documents in Canadian cities. This is due to an increased public interest for urban agriculture. But, the policy implementation remains to be more challenging than policy adoption.

There are several obstacles for urban agriculture such as soil contamination, financing, site vandalism, staffing problems and scepticism from governments and independent organisations (Kaufman & Bailkey, 2000). Governments, local government and community development organisations can support urban agriculture to overcome the obstacles. Kaufman & Bailkey (2000) found in their study that municipal governments don't see urban agriculture as the best use of urban vacant land in the inner city. The municipal governments want instead the land for better tax paying land uses such as housing and industries (Kaufman & Bailkey, 2000). Another problem is that many stakeholders consider that food growing only belongs to farm land instead of urban land. Zasada (2011) wants the urban policy makers to also include care of peri-urban agriculture in the city. A way to give space for urban agriculture and strengthen the urban rural relationship is to create green corridors throughout the cities (Viljonen et al, 2005; Zasada, 2011).

#### 4. Theoretical framework

One of the most influential theories about economic location and land use is the theory from Von Thünen (Nerlove et al, 1991; Parr, 2013). Von Thünen's theory can only be understood in a retrospective view (Grotewold, 1959). It's based upon empirical observations during the 19th century. During that time the model corresponded perfectly to the current reality. His model were first presented in the publication "Der Isolierte Staat in Beziehung auf Landwirtschaft und Nationalökonomie" in the 1826 (Griffin, 1973). Until recent times Von Thünen's model has been greatly influential and is the foundation of the major part of the theories about economic location and land use (Griffin, 1973; Jones et al, 1978; Nerlove et al, 1991; Parr, 2013). It has also been a tool for urban and regional analysis (Parr, 2013). The model from Von Thünen might be old, but it is still applicable for explaining location of production of different crops (Aoyama et al, 2012).

Von Thünen's model explains how distance from the market affects the location of different types of agriculture (Anderson, 2012; Aoyama et al, 2012). It is the landlord that rent out the land to the farmers and he or she rents out the land to the farmer who is capable of paying the highest rent. Von Thünen's model has several delimitations and is based upon a number of assumptions. The model neglects environmental and social conditions (Griffin, 1973; Aoyama et al, 2012). There is no focus on the conditions for the cultivations; soil types are for instance supposed to be the same for all crops. All producers are located around a market centre where the crops are distributed (Parr, 2013). The market centres represent the main markets for the products produced in a country, which Von Thünen calls the *isolated state*. The market centre is usually a city or town. Von Thünen's model states that the commercial agriculture is dependent upon urban systems, where the capital is the market centre for the produce.

Other assumptions and delimitations in the model from von Thünen concerns prices on agricultural outputs and transportation rates, which all are assumed to be fixed (Anderson, 2012). Prices and rates are assumed to be fixed in the model from Von Thünen. Market prices are assumed to be given and not variable for each crop. Transport costs for transportation are crucial for what crops that are profitable to cultivate at different locations. Transport rates are fixed and the transport costs are equal to the transport rates multiplied with the distance from the market. However, the transportation rates are different for different crops. The model includes different categories of farmers and each category is assumed to have the same yield, market price and transportation rates. There are no economies of scale in the model, which means that larger cultivated areas don't affect the cost or the yield per hectares of the production.

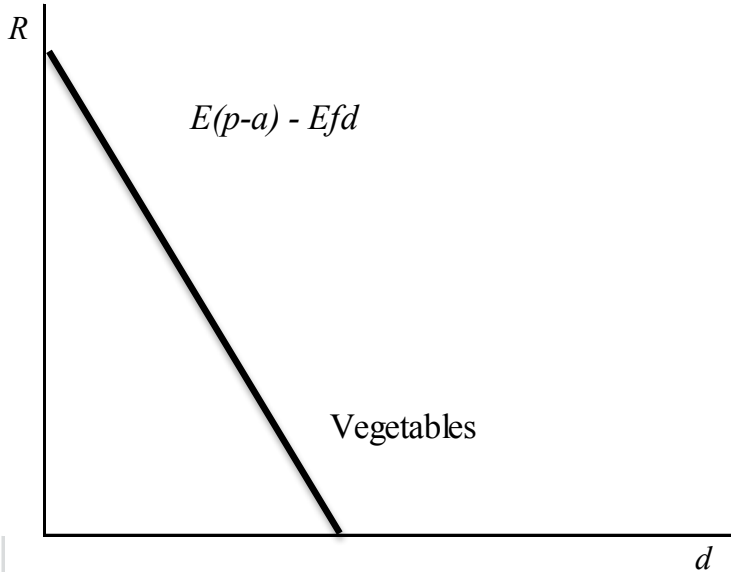
Economic rent is a fundamental part of Von Thünen's model, because the location of a farm activity is dependent on the highest possible rent that can be paid to the land owner (Cromley, 1982). The model relies upon concepts such as opportunity costs and decisions at the margin, which is shown in figure 4 (Jones et al, 1978; *see figure 4*). It is also based upon the fact that all agents strive for economic optimization (Griffin, 1973). The farmers are however assumed to have perfect knowledge of all possible outcomes of their production and based on that they can participate in the bidding process (Cromley, 1982).

The highest possible rent that can be paid to the land lord is a function profit minus transportation costs (Anderson, 2012).  $R$  is land rent or the bid rent.  $E$  is yield of a crop (can be tonnes per hectare). The market price of the crop per tonne is  $p$  and  $a$  is the production cost per tonne.  $E(p-a)$  is profit from growing crop in the absence of transportation costs.  $Efd$  is the transportation cost for a crop. It's based upon transportation rate  $f$  multiplied with the distance from the market  $d$  and multiplied with the yield  $E$ .

*Highest possible bid rent = Profit excluding transport costs – transport costs*

$$R = E(p - a) - Efd$$

In the figure below it can be seen how the bid-rent increases as the distance to the market centre decreases for vegetables (see figure 1) (Anderson, 2012). After some point further outwards the distance results in a too high transport cost. This doesn't make it profitable to cultivate vegetables further away from the market. At the point where the bid-rent reaches zero the transportation costs are equal to the profit. To produce further away will cause losses, which is the reason to why there are no crops cultivated further away from the market centre.



**Figure 1,** The figure shows von Thünen's model for one crop put into a graph. (Adopted from Anderson (2012) p.217)

The curve can however change if the profit increases (see figure 2) (Anderson, 2012). If the profit increases it will be desirable to cultivate even further away from the market centre the curve will move in a parallel direction.

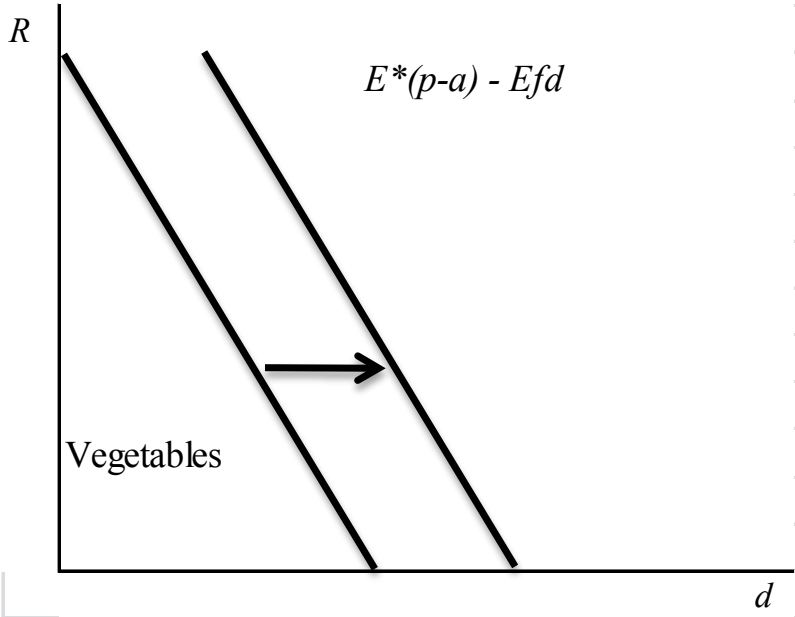


Figure 2, The figure shows what happens if the profit increases (Adopted from Anderson (2012) p.218).

The transportation rate is another important factor that determines the longest possible distance from where it's profitable to cultivate (Anderson, 2012). If the transportation rate decreases it will be desirable to cultivate vegetables further away from the market centre. The curve will then move upwards and the incremental change will be greater as the distance to the market centre increases.

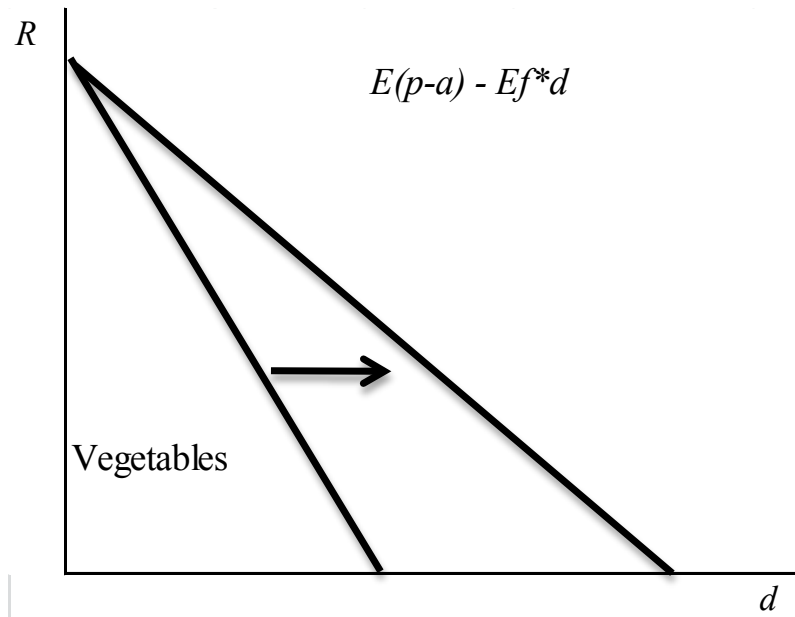
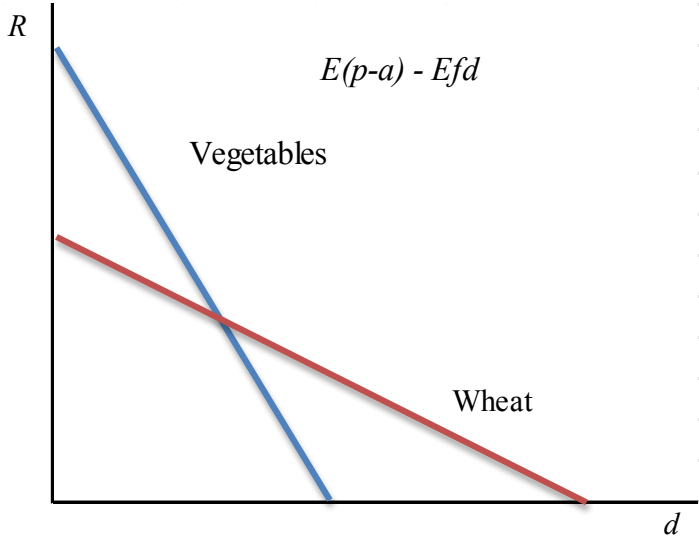


Figure 3, The figure shows what happens if the transportation rate decreases (Adopted from Anderson (2012) p.219).

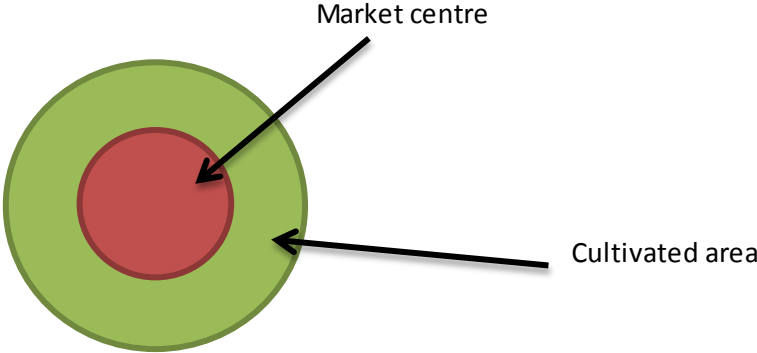
The land rent is the highest possible rent that the agricultural firm can pay to the land owner and it can vary with the distance from the market (*see figure 4*) (Anderson, 2012; Aoyama et al, 2012). It explains why certain areas are dominated by certain types of agricultural production. The closer you come to the market centre the higher production intensity. A good example is to compare vegetable production with wheat production. Vegetables are paid a higher market price, but they are more perishable. This means that vegetables have higher transport costs than wheat. Wheat on the other side is paid a lower market price but is less perishable than vegetables. As a result the wheat becomes more profitable to cultivate than vegetables after a certain distance from the market. Von Thünen’s model can therefore explain why some crops dominate the production at certain geographical locations. Put in a graph the vegetables get a steeper curve than wheat (see figure 4)



**Figure 4,** The figure shows how different crops can be desirable to cultivate at different distances from the market centre. Vegetables give higher yields and have a higher market price than wheat, but wheat has lower transportation costs. It explains why wheat is cultivated further away from the market centres (Adopted from Anderson (2012) p.220).

To visualise the relation between the market centre and the surrounding area there can be a further explanation of the quantity produced from one crop in one area (see figure 5). Let's say that it's only one crop cultivated in one region. Then the total produced quantity of a region is a function of the yield  $E$  multiplied the area of the circle that delimits the feasible region for cultivation around the market town.

$$Q = E\pi L^2$$



**Figure 5**, The market centre and the surrounding cultivated area (Adopted from Anderson (2012) p.221).

Further developments of von Thunen's model include factors such as climate and natural wages in relation to interests and rents (Parr 2013). Another further development of Von Thunen's model includes dual economies, which shows the relation between rural/agricultural and the urban/industrial (Nerlove, 1991). There is also a similar model based upon von Thunen's model can explain the optimal urban land use for all kinds of purposes and operations (Alonso, 1964). For instance use of urban land for residential housing gives the highest bid- rents in the urban periphery.

## **5. Empirical background**

The chapter starts with a presentation of the horticulture in Stockholm in the past and how it has developed to what it is today. Thereafter a regulatory background is given and handles topics such as urban planning policies, Swedish land use laws and land access and agreements.

### **5.1 Horticulture in Stockholm during the 20<sup>th</sup> century until today**

Hässelby is a district in the northwest part of Stockholm municipality that once was a centre for a prosperous horticulture that provided Stockholm with fresh produce and garden products (Johnsson, 2011). The horticulture was an important supplier of garden products to Stockholm between 1900 to 1960-70s when the major part of the business faded away. There were 100 market gardens in the area at its peak in the 1930s, although the decay of market gardens started in the 1950s. In Sweden the market gardens in Hässelby are unique of their kind, both regarding importance and the scale of it.

The urban horticulture came as a result of new access to agricultural inputs and urban expansion (Johnsson, 2011). What made it possible for the horticulture in Hässelby can be found in the beginning of 20<sup>th</sup> century when a lot of unexploited sites were sold and exploited for house construction and for market gardens. The local government had a waste deposit a few kilometres from Hässelby which took care of most waste and sewage from the municipality of Stockholm. To effectively freight the waste and the sewage away from the city the authorities decided to build a railway to the waste deposit, which also provided the garden locality of Hässelby with good communications. The area had also boat connections to Stockholm via Lake Mälaren.

Improved productivity and an increased demand for horticultural products was the main reason to why the horticulture in Hässelby became prosperous (Johnsson, 2011). Good communications and access to land weren't the only local geographical conditions that made it possible for a prosperous horticulture in Hässelby. The closeness to a waste deposit provided a good source of cheap fertilizer for the gardeners and made it possible to have an extensive horticulture without being reliant on fertilizer from an own possessed animal production. The productivity could also be increased due to improved education among the gardeners at special garden schools. A fast increase of the population of Stockholm during the 20<sup>th</sup> century increased the local demand for fresh produce like vegetables. Meanwhile, the welfare and the living standards for people in Stockholm led to a changed demand that favoured more nutritious food like vegetables.

The production systems in the horticulture of Hässelby has shifted and developed throughout the 20<sup>th</sup> century (Johnsson, 2011). The production systems were for long time dominated by cultivation of vegetables, but later flowers became a more important source of incomes for the gardeners due to increased demand. Technological development affected the production methods in many different ways. When the business was in the initial phase the garden products were cultivated on free and or in hotbeds. Later greenhouses came to dominate the production, particularly after central oil-heated greenhouses were introduced after WW2. Investments in new technology and research have been crucial for the gardeners to compete.

Effective transports of agricultural inputs and outputs have been crucial for the horticulture of Hässelby. Good communications to Stockholm made it possible for an effective and large scale supply of inputs like for example fertilizer (Johnsson, 2011). In the other part of supply chain short transport distances enabled a fast distribution of fresh produce to Stockholm. The

railway could both carry vegetables and vendors. Distribution and production were integrated in the firms in the sense of that the vendors usually were from the family business. When trucks started to be used the freights were carried out by people from the market gardens. Distribution was held in the major market places in Stockholm until the local government built market halls for distribution of flowers and vegetables (Johansson, 2008). In the late 50s one firm in Hässelby opened up the country's first garden centre for distribution of garden products.

In 1970s there were only a few of the market gardens left in Hässelby, which can be explained by a couple of factors (Johnsson, 2011). After the Second World War the competition increased from other producers in Sweden and abroad. The import increased and new substitutes became available such as frozen spinach, which made the production of spinach unprofitable. The gardeners were therefore forced to apply new cultivation methods which could prolong the cultivation season, match the harvest season with the demand and increase the profitability. However, many of the garden firms were too small to be able to rationalise their production enough to remain competitive (Johansson, 2008).

The decay can also be explained by generation shifts, lack of labour and profitable alternative land uses (Johnsson, 2011). Most of the firms in Hässelby were small family business with no or a few employees and in the 1950s many of the second generation gardeners were about to retire. However it proved to be difficult for many firms to find family members to take over the firms. Lack of labour made it difficult for many firms to proceed with the gardening. During the same time Stockholm expanded rapidly and many of the close-by neighbourhoods became exploited for house construction. The market gardens of Hässelby were never forced directly to give up their land for other land uses. Instead an agreement was made between the gardeners' interest organisation and the municipality's planners, which stated that allotments only could be used for house construction as a result of private disposals. Disposal of productive land shall rather be seen as a result of a situation of increasing competition, lack of labour and increased land prices.

Today it's almost no traces left of the gardens (Johnsson, 2011). There are only two garden firms who survived until recent time (Johnsson, 2008). Characteristics of them were the fact that they were medium-sized firms, they succeeded with a change of generation and they managed to keep a high productivity by specialisation and continuous rationalisations. For the future there are numerous challenges if urban horticulture is supposed to be created in wider commercial scale again in Stockholm which are the following (Pers. with, Johnsson, 2014):

- Competition of urban land for construction of houses
- The large investment needs for commercial scale horticulture in relation to the returns
- Competition from cheaper imported vegetables and flowers from abroad
- The lack of labour force – there are few educated gardeners today in Stockholm

## **5.2 Regulatory background**

This section is explaining urban planning in Sweden and relevant Swedish laws concerning urban agriculture in Sweden.

### **5.2.1 Planning of an urban area**

Planning of a new area is process, which both includes a creation of a comprehensive plan and a plan for the zoning (Björk et al., 2008). The *comprehensive plan* is constituted by the municipal government and shows the existing land use within the municipality and which areas that it wants to change or exploit in the future. The next step in the process is the zoning.



It shows which areas that shall be built upon, what is allowed to be built in the areas, how streets shall be drawn, in what extent it is allowed to be build and what activities that are permitted in the areas.

In Sweden it is the municipalities who have the monopoly on the zoning and the decision of the zoning involves a longer process (Carlsson, 1998, Björk et al., 2008). However, several stakeholders have to give their opinions and the plan for the zoning of an area. The plan usually needs to be revised a couple times for it is finally accepted in the municipality council. After the plan for the zoning has been accepted the exploitation of an area can begin.

### **5.2.2 Expropriation**

To get land for expanding a city and for construction of new housing areas the municipal government can expropriate land (Julstad, 2005). Expropriation means that a land owner loses his ownership right to land in exchange for financial compensation. The land owner can also be enforced an easement or get limited access to his land through expropriation. In Sweden it is the state, county government or the municipal government who have the right to expropriate land. Although, it is important to state that expropriation is only allowed for purposes that serves public interests, according to the Swedish law (Swedish law, ExL 1 kap). One purpose for which expropriation serves a public interest is for growing urban areas and construction of new housing areas (Swedish law, ExL 2 kap). There are of course other purposes to for which expropriation is allowed such as construction of new infrastructure, public buildings, water facilities etc.

### **5.2.3 Restrictions of land use**

There are restrictions about how land is allowed to be used and be exploited; one restriction concerns agricultural land. According to the Swedish law there are regulations about land use and which type of land that has a considerable value for the public, the society and future generations (Swedish law, MB, 1 kap). The municipal governments are forced by the law to show in the comprehensive plan what areas that are of public interest to preserve. These areas also must be taken into account in the zoning (Swedish law, PBL, 4 kap § 17, 33-34). Highly productive agricultural land is one type of land that is of public interest to preserve (Swedish law, MB, 3 kap. 4§ 1:a stycket). It's therefore not allowed to exploit highly productive agricultural land for construction of buildings. There is however an exception; that exception is for land use of highly societal interest when there is no other land available.

### **5.2.4 Land access and agreements**

There are different ways that the urban farmer can get access to land and there are also different types of agreements between land owners and urban farmers (UNDP, 1996). An urban farmer can have access to land by owning it, renting or leasing it. It's also possible that the farmer get access to the land to the land through informal agreements. Economic agreements and usufruct agreement means official access and that rent is paid for the land. Farming under permit is an informal agreement and means no official access to land, but access with permission.

## **6. Empirical data**

The empirical chapter consists of the conducted interviews which are sorted under the sections advantages, disadvantages and constraints regarding the economic factors influencing the Swedish businesses in the urban agriculture in Stockholm and Malmö.

The interviews are with Göran Larsson (Odlå i Stan), Jenny Nilsson (Dammstorps handelsträdgård AB), Maria Varnauskas (Business Sweden), Håkan Sandin (Tillväxt Trädgård), Gunnar Würtz (former Solbackens handelsträdgård AB), Kjell Elander (Bondens egna Marknad) and Bo Rappne (Slottsträdgården i Ulriksdal).

### **6.1 Economic advantages with urban agriculture**

From the conducted interviews there are many identified economic advantages with urban agriculture. These advantages concerns short transportation distances, demand for local food, industrial symbiosis and synergies and business models.

#### **6.1.1 Benefits for stakeholders in urban agriculture and motivations for investing in UA**

The whole horticultural industry can benefit from urban agriculture, which includes companies in the countryside (Pers. with, Sandin, 2014). Most people are living in cities and it also that most of the labour force and entrepreneurs are found in the cities. The horticultural industry can create many new jobs. Since 2008 until today the revenues have increased by 2 billion Swedish kronor and created 2000-3000 new jobs during the same period (Pers. with, Sandin, 2014). The food industry is another stakeholder who can benefit from urban agriculture because they can receive new suppliers (*ibid*). Another aspect is the already existing horticulture which can get a bigger market when the interest for urban agriculture increases.

The major reason for firms to invest time and financial resources in urban farming is to create employment and the fact that the food sector is a constantly growing business (Pers. with Sandin, 2014). Constantly increase of the demand makes investments in the food sector to a quite secure investment. From a national perspective urban agriculture can be interesting from its possibility to contribute to national self-sufficiency in food (Pers. with, Würtz, 2014).

#### **6.1.2 Short transportation distances and closeness to markets and consumers**

Urban agriculture has an advantage with short transportation distances and closeness to the market (Pers. with, Larsson, 2014; Pers. with, Nilsson, 2014; Pers. with, Elander, 2014; Pers. with, Rappne, 2014). Closeness to the market means closeness large consumer groups (Pers. with, Nilsson, 2014). Urban farmers that are located close to other shopping areas and trafficked roads can utilise it if they are selling directly to the consumers. It's because the consumers then can do complementary purchases from the farms when they are passing by. When a producer sells directly to consumer the producer can get an immediate response from the consumer (Pers. with, Elander, 2014; Pers. with, Rappne, 2014).

Another customer group to urban farmers is the distributors, who benefit from having local suppliers. The retailers have a lot to gain from short "environment friendly" transports and closeness to their suppliers (Pers. with, Varnauskas, 2014). The closeness to the suppliers allows the retailers to have smaller storages and instead they can rely on constant flow of products in smaller volumes. Today the retailers are working intensively with sustainability issues and sustainability is an important part of their marketing strategies. Of that reason the

short transportations enabled by the urban farmers makes them attractive as suppliers to the food retailing industry.

From an economic geographic point of view the closeness to big consumer groups is positive for the urban farm business (Pers. with, Varnauskas, 2014). The closeness to urban consumers among urban farmers offers opportunities to adapt to local demands (Pers. with, Sandin, 2014). Closeness to customers is a major advantage no matter the scale of the production. For small-size farmers the closeness to consumers offers the opportunity of using niche strategies and produce expensive high-quality products that are demanded locally.

### **6.1.3 Industrial symbiosis and utilisation of local resources**

Warmer climate in the cities is an economic advantage for urban agriculture (Pers. with, Larsson, 2014; Pers. with, Sandin, 2014). The warmer climate in the cities depends on all waste heat from buildings, which is beneficial for the vegetation. The surplus of heating can with right technology and planning be utilised in greenhouses. Cities produce a big amount of waste that can be taken care of and used as fertilizer in cultivations.

In urban areas there are good infrastructure, good access to labour force and there are also unused spaces for urban agriculture (Pers. with, Sandin, 2014). Urban agriculture can utilise many unused spaces in cities and does not necessarily require fertile soil. In cities there are surpluses of labour force that can be employed, which is not always the case in rural areas (Pers. with, Varnauskas, 2014; Pers. with, Sandin, 2014). In a low-density populated country like Sweden there is, relatively to the country's population, an adequate infrastructure that is somewhat oversized (Pers. with, Sandin, 2014). The infrastructure is particularly adequate in intra-urban and peri-urban areas in Swedish cities. Urban farmers can utilise the good infrastructure even more than it does today. Economic benefits of urban agriculture can fully be utilised through industrial symbiosis with closed circulations; it can be household waste that is being used as fertilizer for cultivation of vegetables.

There is also a big potential in getting other parts of the Swedish industry in urban agriculture to create industrial symbiosis (Pers. with, Sandin, 2014). There are investment opportunities for corporations from other sectors. One example is the possibility for companies to invest in greenhouses and then conduct leasing agreements with interested urban farmers. It would be revolutionary for the horticulture, because until today the greenhouses have always been owned by the producers themselves. There are also companies that possess valuable resources which could possibly be utilised by the cultivators. There is for instance a big forestry company that has big amounts of surplus heating from their business which have the potential of being used to drive greenhouses.

### **6.1.4 Demand for local foods**

Among today's consumers there is a growing demand for local grown food (Pers. with, Varnauskas, 2014, Pers. with Elander, 2014). The biggest demand for local grown food is found among consumers in cities like Stockholm. Local grown food is a trend in which the consumers are getting more interested in how and where the food is produced. They are also demanding better quality on the food (Pers. with, Larsson, 2014). To being able to satisfy these demands the producers must produce food of higher quality but with lower persistency as a consequence (Pers., with Elander, 2014). Urban agriculture can satisfy the demand for local grown food of high quality through its short transportation distances and its intensive

production of high-value food. Daily fresh vegetables are also highly demanded of many restaurants. It makes urban farming interesting for restaurant owners.

#### **6.1.5 Synergies within urban agriculture**

Urban agriculture can create and gain from economic synergies with other sectors or businesses. An urban farm can create synergies with other shopping areas and stores, where the urban agriculture can work as a place for complementary purchases (Pers. with, Nilsson, 2014). Another type of synergies can be within the farm business itself. One example is the market garden Slottsträdgården in Stockholm, which have café and restaurant business integrated with sale and production of vegetables (Pers. with, Rappne, 2014). Together the different parts of the business are co-linked and create synergies; the café/restaurant wouldn't for example be profitable without the garden part of the business.

There are also positive synergies between the rural- and urban agriculture (Pers. with, Nilsson, 2014; Pers. with, Sandin, 2014). Urban farming can easily be extended to rural sites if the business requires more space than what's available in the city. In cities the main problem is the lack of space, but by extending cultivations to surrounding rural areas the urban farming can contribute to rural development. Urban agriculture can promote rural agriculture and increase the interest for products from the national rural agriculture (Pers. with, Würtz, 2014). It can also be the opposite, so that the rural agriculture around the cities promotes urban agriculture (Pers. with, Sandin, 2014).

#### **6.1.6 Business models**

There are several business models for urban agriculture and the business models for urban agriculture do not necessarily need to be just about production of food (Pers. with, Sandin, 2014; Pers. with, Würtz, 2014; Pers. with, Rappne, 2014). Instead the business can easily be extended to include other types of businesses that can take advantages of closeness to consumers in cities. When food production becomes a part of the urban landscape the consumer habits will change; it also means that there will arise new business opportunities as a result (Pers. with, Sandin, 2014). The market garden Slottsträdgården in Stockholm has multiple businesses (Pers. with, Rappne, 2014). The businesses involves greenhouse cultivations and free-land cultivations of flowers and vegetables, one farm shop/garden centre, restaurant/café, conference and banquet hall and consulting within garden design. In this business each activity is necessary for the business as whole.

Multiple businesses are about delivering of an experience rather than just a product. This means that the farmer can charge much higher prices (Pers. with, Würtz, 2014; Pers. with, Rappne, 2014). The commercial value in urban agriculture lies within conducting multiple businesses and deliver experiences rather than just food products (Pers. with, Würtz, 2014). The multiple businesses involves sale of food products directly to consumers which offers higher margins and better possibilities to adapt to local demands (Pers. with, Würtz, 2014; Pers. with, Rappne, 2014). For instance roof-top gardening means that the producer produces and sells his products where the consumers live. Multiple businesses also enable the farmer to spread the risks.

The health and experience aspects of urban agriculture can be utilised by companies. There are many companies which have started to offer participation in urban farming in health purposes (Pers. with, Elander, 2014). These companies offer people with stress diagnosis to recover through participating in urban agriculture. Urban farmers can also conduct special

subscription agreements with consumers. The consumer pays the farmer to cultivate the land and deliver vegetables in return for payment to the farmer. It's important to say that the consumer also can participate in the cultivation and that he or she owns the cultivation. However, maybe the most profitable business model for urban agriculture is when it's created through sale of pre-packed solutions and when the building sector gets interested in it (Pers. with, Sandin, 2014). There are big opportunities for architects and garden engineers to sell pre-packed solutions for urban cultivations and companies can sell pre-made cultivation sites. When urban agriculture becomes a part of the modern architecture and how new buildings are constructed the urban agricultural industry will generate billions of SEK in revenues.

## **6.2 Economic disadvantages**

In the conducted interviews there are identified three different groups of economic disadvantages. These groups are land prices and access to land, competition, problems with origin and lack of supporting industry in Sweden.

### **6.2.1 Land prices and access to land**

The biggest economic disadvantage with urban agriculture is high land costs and high opportunity costs (Pers. with, Varnauskas, 2014; Pers. with, Würtz, 2014; Pers. with, Elander, 2014; Pers. with, Rappne, 2014). Opportunity costs are the returns that would have been received if the land used for an alternative land use, for example industries or shopping malls. The expensive land means that it requires large investments to start up a new horticultural business. It also means that the business requires big returns to cover high capital costs and high opportunity costs. In the reality urban agriculture suffers from mediocre returns in relation to the big required investments (Pers. with, Würtz, 2014). Due to the high opportunity costs it is difficult to find buyers are willing to use the land for cultivation. When cities expand the prices on the surrounding agricultural land is getting more expensive too. Soil contamination is another risk for urban farmers and to restore contaminated soils requires big investments (Pers. with, Varnauskas, 2014; Pers. with, Larsson, 2014).

### **6.2.2 Competition**

The competition from the other producers is fierce in the horticultural sector, both regarding prices and quantity produced (Pers. with, Nilsson, 2014; Pers. with, Elander, 2014; Pers. with, Würtz, 2014). It is the biggest economic disadvantage for urban agriculture. To be competitive in the horticultural industry there is a need of being cost effective even if there is a possibility of charging higher prices on locally produced products (Pers. with, Sandin, 2014). The Swedish horticulture has some competitive disadvantages. One competitive disadvantage is high salaries for the workers in relation to other European countries (Pers. with, Elander, 2014). This means that the Swedish horticulture is suffering from high costs. Producers from countries like Belgium and Netherlands have the advantage of having industrial clusters of horticultural production, which provides them with advantages of scale (Pers. with, Würtz, 2014). Swedish producers are leading the development towards a sustainable horticulture. It is however financially costly and makes the Swedish horticulture less competitive (Pers. with, Sandin, 2014).

### **6.2.3 Problems with origin**

The term locally produced is problematic because of the inconvenience of communicating its origin to consumers (Pers. with, Würtz, 2014). Today the most well-known certification/label for local produced food in Sweden is Svenskt sigill. The problem is however that it only tells

that the product is produced in Sweden and doesn't specify where in Sweden it's produced. Today's retailers are purchasing large quantities that are distributed over the whole country, which makes local production a less relevant issue. Fast transports have also made the advantage of being local less relevant.

#### **6.2.4 Industrial conditions for urban agriculture**

Looked upon the industrial conditions for urban agriculture the Swedish horticulture suffers from a couple of disadvantages (Pers. with, Würtz, 2014). In Stockholm most of the vegetable production has ceased and it's today difficult to find labour force to work in gardens. The reason why it's hard to find labour force depends on the difficulty in providing workers similar high salaries as in other industries. Before, there existed a supporting business to the horticulture in Stockholm that was necessary for the business, which could be laboratories for soil analysis. That supporting business disappeared when the market gardens were closed down in western Stockholm.

### **6.3 Constraints**

In the interviews there are two groups of economic constraints identified for urban agriculture. These are land use and regulatory.

#### **6.3.1 Land use**

The major constraint for urban agriculture is the lack of land for cultivation (Pers. with, Larsson, 2014; Pers. with, Nilsson, 2014; Pers. with, Elander, 2014). Commercial urban cultivations requires much more urban land than cultivations for own consumption (Pers. with, Larsson, 2014). There is not lack of physical land, but the available physical land is owned by the municipalities and farmers usually don't have access to it (Pers. with, Elander, 2014). The problem with access to land is urgent for intra urban agriculture, particularly in relation to the peri-urban areas where there is more free land available (Pers. with, Larsson, 2014). There is however also fierce competition about land in peri-urban areas and urban sprawl also makes it difficult to find farm land for renting (Pers. with, Varnauskas, 2014; Pers. with, Nilsson, 2014). Other stakeholders that want to exploit agricultural land are putting a constant pressure on the owners of agricultural land as the city grows (Pers. with, Nilsson, 2014). In Jenny Nilsson's neighbourhood in Malmö there is plan for 1000 new detached houses, which makes her land more attractive for alternative land use.

One example of problems with lack of land for cultivation and how it's affecting the conditions for urban agriculture can be found in Malmö. Jenny Nilsson (2014) would appreciate if more people started up cultivations similar to hers; it would result in an increased supply and a bigger interest for locally produced garden products (Pers. with, Nilsson, 2014). But to start up a new business requires plenty of space and there is a lack of space in an expanding city like Malmö. Construction of new detached houses is the main cause of the urban sprawl in Malmö. One might suggest moving the cultivations further away outside the city, but it's not a good option neither because the competitive advantage of being close to the consumer would then be lost.

#### **6.3.2 Regulatory**

A key challenge for urban farmers is the political system in Sweden with municipal governments that are restrictive with providing land for farming in cities (Pers. with, Sandin, 2014; Pers. with, Larsson, 2014). In Sweden the municipalities have monopoly on zoning and usually the municipal governments own a lot of land (Pers. with, Nilsson, 2014; Pers. with,

Sandin, 2014). It's difficult for small businesses to be able to rent land from the municipality; instead there are only bigger actors that tend to get permission to rent land (Pers. with, Larsson, 2014). In Malmö short leasing agreements is a problem. Malmö municipal government's leasing agreements are on 1 year basis (Pers. with, Larsson, 2014; Pers. with, Nilsson, 2014). It's also difficult to rent land that will not be used during the coming 10 years.

How the municipal governments' policy is affecting urban farmers is much dependent on how the zoning looks like (Pers. with, Nilsson, 2014). It's easier to get support from the municipal governments in smaller cities. A peri-urban farmer is very dependent upon local decrees and zonings (Pers. with, Nilsson, 2014). Jenny Nilsson (2014) considers it being ethically wrong when the local government forces farmers to sell their land for a lower price than the local government will get when it sells the land further to private actors. An expropriation of parts of Jenny's owned land would be negative, even if the planned houses in her neighbourhood aren't a threat towards her farm business. Bo Rappne (2014) says that if his land didn't belong to the royal court it would probably already been exploited for construction.

Commercial scale urban agriculture requires big investments and it is dependent on long term economic agreements (Pers. with, Würtz, 2014). Green houses and other outbuildings, that are needed in the production, require depreciation times that are longer than 20 years. It also requires land rights and contracts that are valid for at least 20-50 years forward in time. Dammstorps handelsträdgård has had plans to expand their gardening business before, but the plans have been cancelled due to too short contract periods. It's complete meaningless to invest 400 000 SEK in something that the farm only will dispose during one year for granted (Pers. with, Nilsson, 2014).

At the moment the main policy for food procurement in Swedish public sector is that all food shall have the lowest price (Pers. with, Würtz, 2014). However, if the procurement policy also included demands for local produced food it would be in favour for urban agriculture. It's a tough obstacle for Swedish food producers that Sweden is best on following the agricultural directions from the EU when the Swedish state has a low price policy in all public procurement.

# 7. Analysis and discussion

In this section there will be an analysis and discussion around the research question and this study's results.

## 7.1 Analysis

Here there is given an analysis of the economic factors influencing urban agriculture.

### 7.1.1 Economic arguments for urban agriculture

The first parameters in Von Thünen's model are the yield and the price; together these factors are the revenue gathered from the production per hectares (Anderson, 2012). In this study production of vegetables in urban environments are of the main interest. Urban agriculture tends to produce vegetables that can be charged a high price (Pers. with Sandin, 2014). It is necessary if urban agriculture ought to prevail in the bidding process and exist. Another important characteristic of urban agriculture is high yields per hectares (ibid). This is also important for the capability of paying enough high rent to win the bidding process.

Perishability is an important economic factor for production of vegetables in urban areas, because it is complete related to the transportation costs in Von Thünen's model (Anderson, 2012; Aoyama et al 2012). Vegetables with high perishability therefore need to be cultivated close to the urban markets (Pers. with Elander, 2014). In reality highly perishable vegetables has superior quality which makes it possible to charge a high price for them (see figure 6). Highly perishable vegetables are not adapted for long transports.

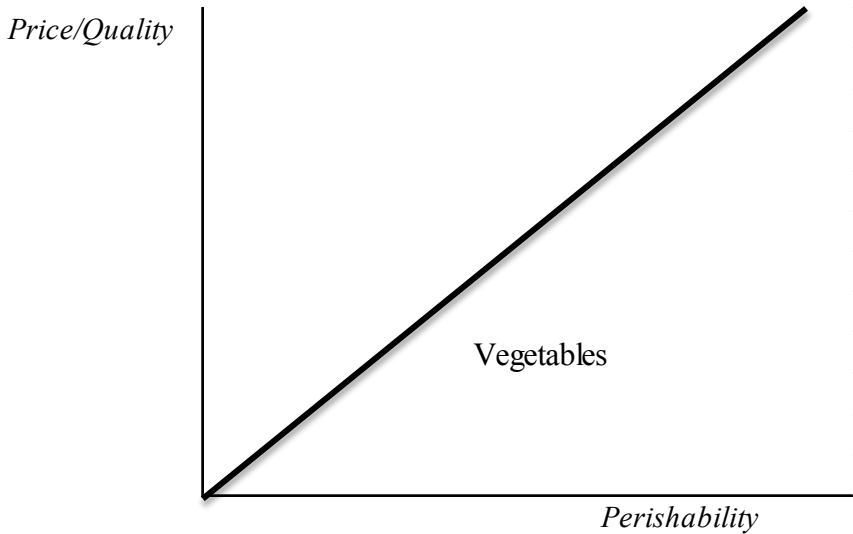
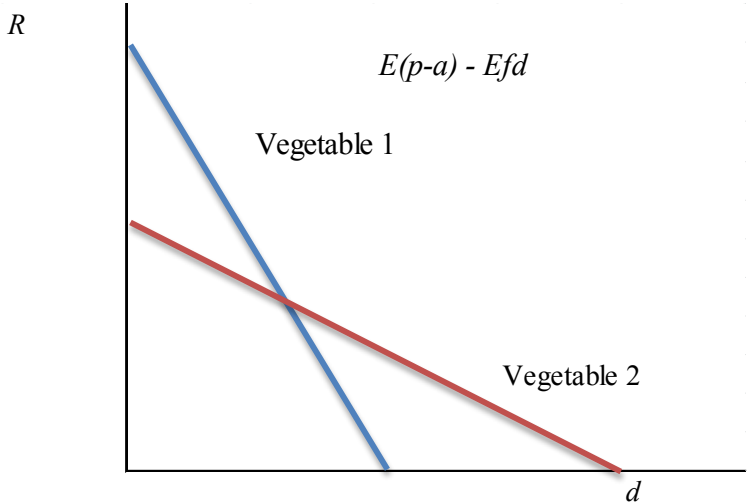


Figure 6, The figure shows the relation between price/quality and perishability

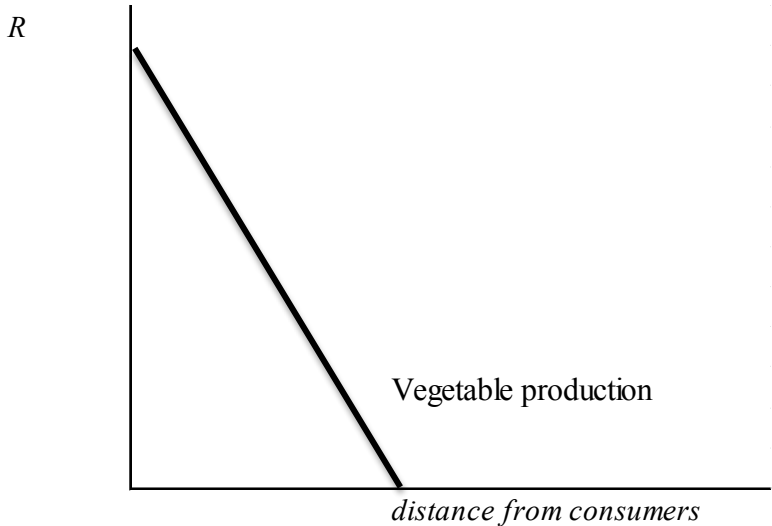


There are different kinds of vegetables. According to Von Thünen vegetables of high perishability would be the dominating crop close to urban market centres (see figure 7; Anderson, 2012; Aoyama et al, 2012). In a graph this would result in a steep curve downwards. Meanwhile, less perishable vegetables would be cultivated in more remote areas as a result of their lower profits before transport costs and lower transport costs. Urban agriculture has therefore a clear competitive advantage if it can deliver vegetables of superior quality to high prices (Pers. with Elander, 2014).



**Figure 7**, The figure shows that vegetable 1 of high quality, price and perishability would be dominating the production closer to urban centres.

Urban agriculture has an advantage with short transportation distances and closeness to the market (Pers. with, Larsson, 2014; Pers. with, Nilsson, 2014; Pers. with, Elander, 2014; Pers. with, Rappne, 2014). Von Thünen’s model is more of a supply function than a demand function. When it’s stated that urban agriculture can utilise short distances to consumers it can be assumed that the bid rents then would be negatively correlated with the distance to the consumers for the producers (see figure 8).



**Figure 8**, The figure shows how that the highest bid rent that can be paid decreases as the distance from consumers increase. R is bid rent

Shorter transports means less greenhouse gas emissions. It can be related to von Thünen's statement that longer transportation distances have negative effects on the highest possible bid rent that can be paid (Anderson, 2012; Aoyama et al 2012). Von Thünen's theory about bid rents and transportation costs can be an even more relevant theory than it is today in the future. It can be due to higher fuel prices and bigger environmental concerns among stakeholders like suppliers, retailers and governments. Retailers are already now seeking for short "environmental friendly" transports and local suppliers (Pers. with Varnauskas, 2014).

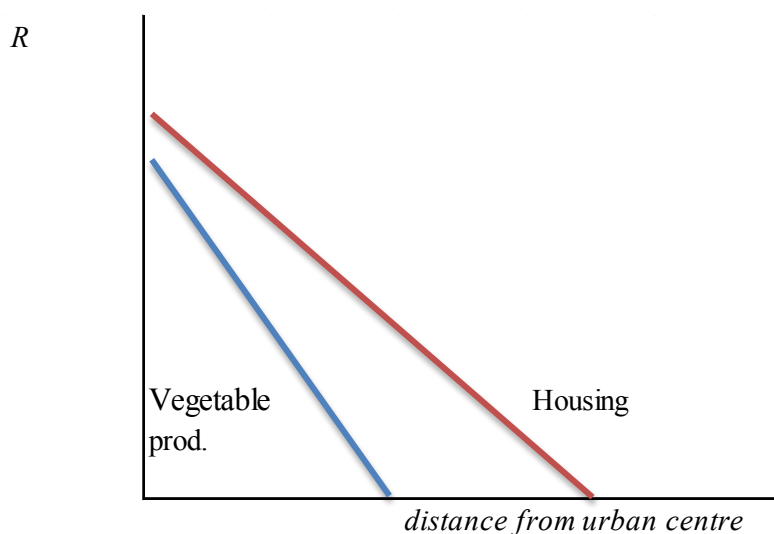
Urban agriculture is considered to not necessarily be about just production (Pers. with Rappne, 2014, Pers. with Sandin, 2014, Pers. with Würtz, 2014). Von Thünen's model is complete based on production and it's difficult to apply it when the urban farm offering more than one product like vegetables. Von Thünen's model is complete focused on agricultural production and not on services, which means that it can't explain alternative business models for urban agriculture completely. But the theory about economic rent and bid rents remains the same even if it's applied urban agriculture with multiple businesses. There is a reasonable thought that alternative business models can be necessary for urban agriculture in order to being able to pay the highest bid rents close to urban centres. A feature of multiple businesses is that the sale is at the production site. Transport costs would then be zero as a result of the non-existent need for transportation to urban markets. This would increase the highest possible bid rent that can be paid by the urban farmers.

If the production is integrated with distribution there will be no transportation costs. In urban agriculture the production is often integrated with distribution (Pers. with Würtz, 2014, Pers. with Rappne, 2014). This would lead to higher margins and ability to pay a higher bid rent as a result of no use of intermediaries. On the other hand the model of Von Thünen is like most models a simplification of the reality (Anderson, 2012; Aoyama et al 2012). Producers that sell directly to consumers are therefore hard to put in a specific geographical location based on Von Thünen's model. This can however change if a modification is done of Von Thünen's model. The use of transportation costs is interesting because they only concerns costs for freight in von Thünen's model. Let's suppose that the transportation costs concern the costs for consumers to get to the production site where the food is distributed. It would mean that the bid rent is a function of profits minus the cost for consumers to reach the production site. Central location would then favour cultivation of vegetables with the shortest distances to the consumers.

### **7.1.2 Economic disadvantages with urban agriculture:**

Von Thünen's model is designed for land use at local level and regional level (Anderson, 2012; Aoyama et al 2012). It explains the location of economic activity around market centres in region or a local level. The competition is easiest analysed at local level. Basically, the actor who is able to pay the highest bid rent is getting the right to rent the land and conduct operations there. Competition at local level forces the actors to minimize costs and to maximise revenues in order to be able to conduct the business at all on a central location. However, fierce competition from abroad or from domestic competitors can result in smaller profit margins and therefore decrease the extent of certain farming operations (Pers. with, Nilsson, 2014; Pers. with, Elander, 2014; Pers. with, Würtz, 2014). Competitors at local level can get an advantage if they have lower transportation costs. It would also determine what kind of operations that would be conducted close to urban centres.

Competition can also be about land. From Von Thünen's model it can be deduced that increased competition from other producers can prevent a producer to conduct operations in more central locations (Pers. with, Varnauskas, 2014; Pers. with, Würtz, 2014; Pers. with, Elander, 2014; Pers. with, Rappne, 2014). In urban regions the bid rents are the highest closest to the urban centre and the profits from agricultural production is therefore needed to be high in order to pay the highest bid rents (*see figure 9*). Urban agriculture is highly productive and is forced to have high margins in order to pay the highest bid rents. However the model of Von Thünen doesn't include alternative land uses such as housing or industrial operations (Anderson, 2012; Aoyama et al 2012). Housing rents are not related to production but are a function of distance to urban centres (*see figure 9*). This means that production of urban agriculture is forced to be able to pay higher bid rents than alternative land uses such as housing and industrial operations. A clear disadvantage for urban agriculture is that the highest possible bid rents that can be paid can be high from housing and industrial operations (Pers. with Nilsson, 2014; Pers. with, Varnauskas, 2014).



**Figure 9**, The figure shows how the capability of paying higher bid rents among house constructors can make it difficult for urban production of vegetables to compete about land disposal rights. *R* is bid rent

Another economic factor is the opportunity costs, they are however not included in Von Thünen's model. The municipal governments in Malmö and Stockholm tend to give land access to the actor who is able to pay the highest rent or pay the highest price for the land (Pers. with Larsson, 2014; Pers. with, Nilsson, 2014) According to the empirical data municipal governments gets the highest profits from housing construction (Pers. with Nilsson, 2014). This can change if the municipal governments change their policy and let the farmers who are able to pay the highest rent get the land access.

Here there is important to say that there it's assumed that the same types of vegetables can have different standards and features. In fact the model of Von Thünen is about real options in the agriculture (Cromley, 1982). This requires however that the farmers are perfectly aware of these real options. It is something that isn't always the case in the reality. Profits aren't neither constant and can vary between years. It's assumed here that Von Thünen meant expected profits as a key factor for the landlords' decision making process and their search for the highest bid rents.

In Von Thünen's model the agricultural production is grouped after certain kinds of production (Anderson, 2012; Aoyama et al 2012). The area where it's feasible for vegetable production is a group of several vegetable producers. This could create an industrial cluster. There are however almost no vegetable producers in Malmö or in Stockholm and there are no supporting industries (Pers. with Nilsson, 2014, Pers. with Würtz 2014). Lack of industrial clusters is a disadvantage for urban agriculture in Malmö and Stockholm. Intensive vegetable production requires supporting industries for achieving high yields. It can change if other industries got interested in horticulture and would provide resources to urban agriculture.

### **7.1.3 Constraints**

The model from von Thünen doesn't include that there can be a scarcity of land, it only mentions the area of each feasible region for certain kinds of agricultural production. It can be assumed that increased bid rents closer to urban centres are partly a function of scarcity of land. Scarcity of land in central location tends to increase land rents. In modern urban agriculture there is becoming more common with production forms that doesn't require fertile land, particularly in the inner part of the urban centre (Pers. with Varnauskas, 2014; Pers with Sandin 2014). Vegetable production, that is integrated with buildings or is conducted in surrounding allotments to buildings, is making the border between different land uses less clear. Most forms of commercial scale urban agriculture are however forced to be more intensive closer to urban centres. That is fact because even if it is integrated with buildings the farmers have to be able to pay the highest bid rent. Bid rent would here be the highest possible rent that can be received from using the different spaces in the buildings. Most of the current commercial urban agricultural operations in Stockholm and Malmö concerns however cultivation on free-land (Pers. with Sandin, 2014, Pers. with Nilsson, 2014, Pers. with Würtz, 2014). There are although projects that aim to create soil-less urban agriculture in commercial scale in a coming future.

The regulatory aspects are in Von Thünen's model not clearly defined (Anderson, 2012; Aoyama et al 2012). However, it's municipal government who often is the landlord. It's also the municipal government who sets the conditions for urban agriculture by having monopoly on the zoning (Pers. with Larsson, 2014; Pers. with Nilsson, 2014). If urban agriculture is to be given fair economic conditions the municipal government can't always follow the logic of Von Thünen's model. That is giving land access to the actor who is able to pay the highest economic bid rent, which could be housing or industrial operations. Instead it has to give land access to urban production of vegetables of sustainability reasons and a national interest of self-sufficiency on food.

### **7.1.4 Validity and trustworthiness of the empirical data**

The major problem with the empirical data is rather connected with the fact that urban agriculture in commercial scale today is very limited (Pers. with Nilsson, 2014, Pers with Wurtz, 2014). It's a constraint for how much the results can be generalized. Another point is the trustworthiness of the empirical data. In this study the trustworthiness of the empirical data is high. All of the respondents in the case study are experts on the field of local food production, which urban agriculture is a part of. There could have been chosen to interview small scale urban farmers that have it as leisure. However, this study is a case study within the field of economics and management. In order to obtain data of high quality and relevancy there has been necessary to interview persons that are well-involved in the horticultural industry and in the food sector. Von Thünen's model explains commercial agriculture, which is another reason to the chosen persons for the case study.

It can be questioned if the empirical data is completely covered by the model of Von Thünen. The previous analysis has proven that this is not always the case. Von Thünen's model is more applicable in Malmö due to it's both a part of an agricultural region and an urban region. If this study focused included all agriculture in an urban region it would be easier to see clear patterns in the data in relation to Von Thünen's model. A personal reflection is that all economic models are forced to do simplifications of the reality.

The use of qualitative data has limitations when Von Thünen's is applied to analyse it. For instance there could have been doing a more detailed study of transportation costs and their importance for urban agriculture. In that case a quantitative study would have been conducted. At the moment it's difficult to obtain detailed data of transportation costs. On the other hand the collected data strengthens the fact that short transportation distances are an economically important factor that favours urban agriculture (Pers. with, Larsson, 2014; Pers. with, Nilsson, 2014; Pers. with, Elander, 2014; Pers. with, Rappne, 2014).

## **7.2 Discussion**

In this part there is given a discussion about the literature and this study's empirical results.

### **7.2.1 Economic arguments for urban agriculture**

In the literature there are mentioned several benefits for urban agriculture, both the empirical data support the fact that urban agriculture can generate new enterprises and is good for the societal and local economy (UNDP, 1996; Viljonen et al, 2005; Pearson et al., 2010; Pers. with Sandin, 2014). Urban agriculture has social economic benefits. UNDP (1996) mentions the importance of urban agriculture for the national agricultural sector which corresponds to the empirical data (Pers. with Sandin, 2014; Pers. with Wurtz, 2014). It concerns both food security and support for the national agriculture. Urban agriculture has a great societal value according to the interviews and the literature (UNDP, 1996; Mougeot, 2000; Whittinghill & Rowe, 2011; Pers. with Sandin, 2014, Pers. with Varnauskas 2014).

A clear similarity between the literature and the interviewees' answers are that they are promoting the benefits of urban agriculture for local communities and local stakeholders (Pers. with Sandin, 2014; Pers. with Nilsson, 2014). Local communities gain from urban agriculture, because urban agriculture gives employment and that money is spent locally (Pers. with Sandin, 2014, Pers. with Nilsson 2014; UNDP, 1996; Viljonen et al, 2005). One interviewee gives employment as a reason for investing in urban agriculture (Pers. with Sandin, 2014). Urban agriculture has the benefit in cities of having good access to labour force. Some of the empirical data are pushing for the fact that retailers can benefit from urban agriculture because they get new suppliers (Pers with Varnauskas, 2014). That benefit is not mentioned in the literature.

That urban agriculture can utilize several urban resources is well supported by both the literature and some of the interviewees (Pers. with Larsson, 2014; Pers. with Sandin, 2014; Hewitt & Hagan, 2001; Mazerueeuw, 2005; Viljonen et al, 2005; Whittinghill & Rowe, 2011; Specht et al., 2013). Hewitt & Hagan (2001) stresses that waste heat from buildings can be utilised to drive greenhouses. They are getting support for that statement from Larsson (2014) and Sandin (2014). Human waste and heating are creating industrial symbiosis in cities between the urban structures and urban agriculture. It is something that derives from a comparison between the literature and the empirical data (Specht et al, 2013; Pers. with Sandin, 2014).

The identified differences between the literature and the interviews concerning the relation between urban structures and urban agriculture are several. Sandin (2014) tells about opportunities for urban agriculture to utilize urban infrastructure and labour force. He also mentions that other industries can support urban agriculture. In the literature it's more focus on the architecture itself and its possible contribution to urban agriculture (Mazerueeuw, 2005; Whittinghill & Rowe, 2011; Specht et al, 2013). Although, it's found in the empirical data that integration with the architecture and building sector provides an industrial synergy (Pers. with Sandin, 2014).

Viljonen et al (2005) put large emphasis on the benefits of short transportation distances for urban agriculture. Von Thünen's model could have been applied in the work of Viljonen et al (2005) to explain the benefits of being located closer to the urban centres. However, Viljonen et al (2005) among others give support that urban agriculture benefits from shorter transport distances due to lower transportation costs (UNDP,1996; Mougeot, 2000; Whittinghill & Rowe, 2011). This is also found in the empiric data collected from the interviews (Pers. with, Larsson, 2014; Pers. with, Nilsson, 2014; Pers. with, Elander, 2014; Pers. with, Rappne, 2014).

According to Von Thünen's model transportation costs would be zero if urban agriculture integrates production with distribution. Urban agriculture usually has production integrated with distribution and has local distribution (Mogeot, 2000). It would then be an economic argument for urban agriculture. The closeness to consumers are emphasised by both literature and the interviewees (UNDP,1996; Mougeot, 2000; Whittinghill & Rowe, 2011; Pers. with, Larsson, 2014; Pers. with, Nilsson, 2014; Pers. with, Elander, 2014; Pers. with, Rappne, 2014).. There are both support in the literature and in the empiric data for the fact that closeness to consumers enables urban farmers to easier adapt to local consumer demands (UNDP,1996; Mougeot, 2000; Whittinghill & Rowe, 2011; Pers. with, Larsson, 2014; Pers. with, Nilsson, 2014; Pers. with, Elander, 2014; Pers. with, Rappne, 2014). This is easier to do when the production is integrated with distribution (Pers. with Nilsson, 2014; Pers. with Rappne, 2014).

There appear several types of business models in both the literature and the empirical data. Business models for urban agriculture can vary. Zasada (2011) tells about urban agriculture that provides local food, educational and recreational services. These attributes corresponds to the answers from the interviewees (Pers. with Sandin, 2014, Pers. with Rappne, 2014, Pers. with Würtz, 2014). Integration of the urban agriculture with the architectural sector is another business model that is found in both the literature and in the empiric data (Mazerueeuw, 2005; Pearson et al, 2010; 5; Whittinghill & Rowe, 2011; Spect et al, 2013; Pers. with Sandin 2014). In general it appears that the possible business models for urban agriculture are endless. The choice of business model is an important issue if urban agriculture ought to be profitable (Pers. with Würtz, 2014). This fact is clearer in the empirical data than it is in the investigated literature.

One of the strongest arguments for urban agriculture in the literature and in the empirical data is the demand for local foods. The demand is both found among consumers and distributors. Local foods are considered to have superior quality compare other non-local food (Ekelund & Tjärnemo, 2009; Visser et al, 2013; Pers. with Larsson, 2014; Pers. with, Varnauskas, 2014; Pers. with, Pers. with Elander, 2014). That is found in both the literature and in the empiric data. To being able to satisfy these demands the producers must produce food of higher

quality but with lower persistency as a consequence. It gives value to the food and enables the producer to charge higher prices.

### **7.2.2 Economic disadvantages:**

One of the biggest economic disadvantages with urban agriculture found in the literature and in the empirical data is the fierce competition of urban land. (Capozza & Helsey, 1989; Plantinga et al., 2002; Cavailhès & Wavresky, 2003; Muto, 2006; Zasada, 2011; Pers. with, Varnauskas, 2014; Pers. with, Würtz, 2014; Pers. with, Elander, 2014; Pers. with, Rappne, 2014). Urban agriculture is facing high opportunity costs in relation to other land uses. According to the literature and the empirical data house construction and urban expansion are important factors to why the urban agriculture is facing high opportunity costs. Urban agriculture on free-land requires urban land. The problem is that urban land is expensive to rent and to buy, which is requiring high investments and high returns from urban agricultural firms (*ibid*). It makes it difficult for urban farmers to expand their business or to start up new businesses. Specht et al. (2013) also writes that zero acre farms are facing similar problems with high investment costs.

The competition and industrial conditions for vegetable production in Malmö and Stockholm are local specific. Viljonen et al (2005) and Würtz (2014) are pointing out the fact the horticultural sector has a fierce competition. The biggest problem for producers of vegetables in Stockholm and Malmö is high costs in relation to their competitors from abroad (Pers. with Würtz, 2014; Pers. with Elander, 2014). Among the existing costs it is mentioned high salary costs for Swedish workers. There is also difficult to compete with the quantity produced and retailers are often requiring large quantities. This would decrease the feasibility of cultivating vegetables close to urban centres. It would also reduce the highest possible bid rent that the producer can pay.

Würtz (2014) says that there is a lack of industrial clusters in Stockholm. This means a lack of supporting businesses. This makes it difficult to be competitive as a vegetable producer in Stockholm and Malmö. Porter (1998) says that industrial clusters are important for agricultural firms if they ought to be competitive. Würtz (2014) and Porter (1998) have the same opinions concerning the importance of supporting industries. The competitors from other countries in Europa have an advantage of being located in industrial clusters (Pers. with Würtz, 2014). There are of course possible to vertically integrate services in the business as done by Rappne (2014). It would then make the firm less dependent of supporting industries.

Location of the producers is in the marketing of vegetables not without problems according to the found literature and one empiric data source (Würtz, 2014; Ilbery & Maye, 2006, Blake, et al. 2010, Dunne, et al., 2010). The main problem seems to be in the communication of the origin. There are criticism of the use of the term local and its meaning (Pers. with, Würtz, 2014; Ilbery & Maye, 2006; Blake, et al., 2010; Dunne, et al., 2010). In the context of Von Thünen's model the producers are assumed to deliver to the local urban centres. Urban agriculture distributes products locally and usually directly to consumers (Mogeot, 2000). This makes the critics of the use of the term local a bit irrelevant for urban agriculture. Another fact is that urban producers can communicate the origin directly to the consumers through the direct contact with them (Pers with Nilsson, 2014).

### 7.2.3 Constraints

A major constraint for urban agriculture is the limited amount of land (UNDP, 1996; Mougeot; 2000; Viljonen, et al, 2005; Mok et al., 2013; Specht et al 2013). This is also confirmed by the empirical results of the study (Pers. with, Larsson, 2014; Pers. with, Nilsson, 2014; Pers. with, Elander, 2014). Mok et al (2013) therefore states that urban agriculture is forced to be intensive on little space. The empirical data gives support for it, but still emphasise that the lack of space makes it difficult for the existing horticulture in urban environments to operate (Pers. with, Larsson, 2014; Pers. with, Nilsson, 2014; Pers. with, Elander, 2014).

There are however opinions that actual land available isn't the problem for urban agriculture. UNDP (1996) says that the problem is that the landlords aren't willing to provide land for urban agriculture or rent it out, which is confirmed by the interviewees (Pers. with Larsson 2014; Pers. with Nilsson, 2014, Pers. with Würtz, 2014). A clear difference between the literature and the empirical data is that the interviewees specify the problem with land tenure more (ibid, UNDP, 1996). UNPD (1996) and Pearson et al (2010) are giving attention to the possibility to cultivate land in vacant and degraded land sites. None of these suggestions are found in the empirical data.

On the other hand there is urban agriculture where the land tenure isn't an equally big issue as for cultivations on free land. Zero acre farms are mentioned in both the literature and in the empiric data (Specht et al, 2013; Pers. with Larsson, 2014, Pers. with Sandin, 2014). But these kinds of farms are not fully developed and they few of them are able to produce enough high yield to be profitable. A major part of the empirical data rather refers urban agriculture as production of vegetables on free-land in Stockholm and Malmö (Pers. with Elander, 2014, Pers. with Nilsson, 2014; Pers. with Wurtz, 2014; Pers. with Rappne, 2014).

The main reason to why urban agriculture is constrained with lack of vacant land is found in the policies of the municipal governments. UNDP (1996) and Huanga & Drescher (2014) point out that land use policies are important for the success of urban agriculture. This has good support in this study's empirical data (Pers. with Larsson, 2014; Pers. with, Nilsson, 2014; Pers. with, Sandin, 2014). Huanga & Drescher (2014) continues by stating that policies, regulations and zoning laws can hinder implementations of local initiatives of urban agriculture. In Malmö that is the case because the municipal government doesn't care about including urban agriculture in their zoning (Pers. with Larsson, 2014; Pers. with, Nilsson, 2014). Their current policy is to give short leasing agreements and the municipal government prefers to use the vacant land for housing construction. It can be due to the fact that they consider urban land shall be used for better tax-paying operations such as housing (Kaufman & Bailkey, 2000). This is only confirms the fact that the regulatory is an important economic factor influencing urban agriculture.

Both Sandin (2014) and Huanga & Drescher, 2014 say however that public interest for urban agriculture can change the interest for urban agriculture. As a result of increased interest among the public has empowered municipal governments in Canadian cities to include urban agriculture in their policies. It shows that the key issue for urban producers of vegetables in Stockholm and Malmö is to create a public interest for urban agriculture. There is also a need for urban producers of vegetables in Stockholm and Malmö to the reach different stakeholders in order to create broad interest and support for urban agriculture (Pers. with Larsson 2014; Pers. with Sandin 2014; Kaufman & Bailkey, 2000).



#### 7.2.4 Recommendations

The municipality can support urban farmers in many different ways. There are demands for longer leasing agreements of fertile land between the farmers and the municipal governments (Pers. with, Larsson, 2014). Jenny Nilsson (2014) would like to see more willingness from the local government to co-operate and be careful with the fertile soil in the municipality. If urban agriculture ought to succeed there is a need for the municipal governments to include urban agriculture in their zoning according to the empiric data (Pers. with, Sandin, 2014; Pers. with, Würtz, 2014). This has also support from Thibert (2012) and Huang & Drescher (2014). For that the potential of urban agriculture must be communicated to the municipal governments so they can adapt their zoning. The municipal governments will be forced to adapt their zoning if the interest for urban farming is growing big enough among the public (Pers. with, Sandin, 2014; Pers. with, Würtz, 2014; Thibert, 2012; Huang & Drescher, 2014). Communication with the public is therefore the single most important issue for urban farmers.

There is an opinion that the municipality also shall work with information spreading (Pers. with, Larsson, 2014). The information should tell where there is land that can be leased and how to start up cultivation. It's particularly the young urban generation that needs to be taught how to cultivate (ibid). At the moment there is a clear distance between the urban and the rural; both geographically and when it comes to knowledge (Pers. with, Würtz, 2014). Why the youth needs to be taught about cultivation is a question about national and local self-sufficiency on food (Pers. with, Larsson, 2014). That knowledge is particularly important in Sweden, because Sweden is one of the countries in Europe with the lowest degree of self-sufficiency on food (ibid).

Even if some literature supports the empiric data concerning recommendations there are also other types of recommendations from the literature. Zasada (2011) wants the urban policy makers to also include care of peri-urban agriculture in the city policy. A way to give space for urban agriculture and strengthen the urban rural relationship is to create green corridors throughout the cities (Viljonen et al, 2005; Zasada, 2011). Municipal governments can also permit urban agriculture on roof-tops of new buildings (Huang & Drescher, 2014).

Jenny Nilsson (2014) argues that the consumers should choose locally produced products to support the local business, create new local job opportunities and to give the local market a better supply. There is need for more social interaction between producers and consumers in order to increase the consumers' awareness about how the food is produced (Pers. with, Nilsson, 2014; Pers. with, Würtz, 2014). It is particular important for urban citizens to know where the food is produced and why the farmers want a better payment for their products (Pers. with, Nilsson, 2014).

If urban agriculture is to be conducted in a commercial scale the local governments need to improve their understanding of local food production (Pers. with, Nilsson, 2014). Without any provided land for food production from the local government it's most unlikely that most of today's urban agriculture will develop into a bigger commercial scale in the city of Malmö. Another important thing if urban agriculture is supposed to be developed to become operated in a bigger commercial scale would be to acquire the right people with right knowledge are getting involved (Pers. with Sandin, 2014). Without right the right people with the right knowledge the development of urban agriculture in Sweden will proceed inefficiently. Sandin (2014) calls for economists, technicians, horticulturists and city planners to be engaged in the development of urban agriculture in Sweden. Nevertheless, the grass-roots have a function and it is to create a public interest for urban farming (Pers. with Sandin, 2014). The

commercial potential for urban agriculture is big because 6.5 million people of the total Swedish population on 9.5 million are interested of gardening (ibid). It's therefore important to find ways to utilise the big interest for gardening and turn it over into a profitable business. Chiefly, it would require long-term focused leadership and more knowledge if urban agriculture ought to be developed into a bigger commercial scale in Sweden. Another requirement is that urban agriculture combines competitiveness with sustainability.

## 8. Conclusions

The first purpose of the case study was to find what are economic factors influencing Swedish urban agriculture. The second purpose was to investigate what are the economic advantages, - disadvantages and –constraints for Swedish urban agriculture. The conclusions derived from this study are the following;

The theory about bid-rents is fundamental for urban agriculture and its economic relevancy. If urban agriculture ought prevail in the bidding process and exist it must be able to set high prices on its products and give high yields. Vegetables of high perishability and high quality have high transportation costs but gives high profits. Urban agriculture is therefore most feasible for production of highly perishable vegetables near city centres. Urban agriculture has a clear competitive advantage if it can deliver vegetables of superior quality to high prices.

Short transportation distances are an economically important factor that favours urban agriculture. Short transport distances to retailers and consumers decreases transportation costs and makes it possible for urban farmers to adapt to local demands. When urban agriculture integrates production with distribution transport costs are minimized, which increases the highest possible bid rent that can be paid. Multiple businesses and alternative business models offer an alternative for urban agriculture and it enables urban farms to pay higher bid rents. Human waste and heating are creating industrial symbiosis and positive synergy effects in cities between the urban structures and urban agriculture. Another important economic argument for urban agriculture is a high demand for local foods.

Fierce competition from abroad or from domestic competitors can result in smaller profit margins and therefore decrease the extent of urban agriculture. Competition from other producers can prevent a producer to conduct operations in more central locations. The problem for producers of vegetables in Stockholm and Malmö is high costs in relation to their competitors from abroad. One of the biggest economic disadvantages with urban agriculture is the fierce competition of urban land and the cost of urban land. In urban regions the bid rents are the highest closest to the urban centre. The profits from agricultural production are therefore needed to be high in order to pay the highest bid rents. Intensive vegetable production requires supporting industries for achieving high yields; in Stockholm and Malmö there are no such industries.

In Malmö and in Stockholm the available urban land for farming is limited, but the major constraint is that the municipal governments are restrictive with renting out urban land. It makes it difficult for urban farmers to expand their business or to start up a new business. It's the municipal government that often is the landlord. Municipal governments' policies tend to hinder implementation of urban agriculture in cities. The reason can be that municipal governments get the highest economic rents from housing and not from urban agriculture.

A first step to give urban agriculture fair economic conditions would be to include urban agriculture the urban zoning and increase the duration of the leasing agreements given by the municipal governments. Increased interest among the public can increase the interest for urban agriculture among municipal governments. It would lead to a more favourable policy for urban agriculture and give urban agriculture better economic conditions. A way to give space for urban agriculture and strengthen the urban rural relationship is to create green corridors throughout the cities.

## Reference list

### Books and published sources:

Anderson, W., P., 2012, "*Economic Geography*", Routledge, Taylor & Francis Group, Abdingdon

Aoyama, Y., Murphy, J., T., Hanson, S., 2012, "*Key concepts in economic geography*", SAGE publications Ltd

Brealey, R., A., Myers, S., C., Allen, F., 2013, "*Principles of Corporate Finance*", 11th edition McGraw Hill, Berkshire

Björk, C., Nordling, L., Reppen L., 2008, "*Så byggdes staden*", andra upplagan, AB Svensk Byggtjänst

Carlsson, P., 1998, "*Den förnyade villastaden- stadsgestaltning med förhinder*", KTH

Couch, C., Leontidou, L., Petschel-Held, G., 2007, "*Urban Sprawl in Europe*", Blackwell Publishing Ltd

Hewitt, M., Hagan S., 2001, "*CITY FIGHTS – debates on urban sustainability*", James & James Ltd, London

Johnsson, B., HF., 2008, "*Sju handelsträdgårdar i Hässelby – artiklar publicerade i Hässelby hembygdsblad åren 2004-2008*", Hässelby Hembygdsförenings Skriftserie nr 11

Johnsson, B., HF., 2011, "*BLAND BLOMSTERKUNGLAR OCH VÄXTHUS – Trädgårdsepoken i Hässelby*", Hässelby Hembygdsförenings Skriftserie nr 13

Julstad, B., 2005, "*Fastighetsindelning och markanvändning*", tredje upplagan, Vällingby, Norstedts Juridik AB

Robson, C., 2011, "*Real world research*", third edition, John Wiley & Sons Ltd., London

UNDP, 1996, *Urban agriculture – Food, Jobs and Sustainable cities*, United Nations Development Programme, Publication Series for Habitat II, Volume One

Viljonen, A., Bohn, K., Howe, J., 2005, "*CPULs – Continuous productive urban landscapes*", Elsevier, Architectural Press

Vogt, P.W., 2005, *Dictionary of Statistics & Methodology*, 3rd edition, London: Sage Publications Ltd.

Yin, R. K., 2009, *Case Study Research – Design and Methods*, fourth edition, SAGE publications

### **Reports and publications:**

Ahlström, H., Kjellberg, E., 2011, ” THE CITY BALCONY”, Swedish University of Agricultural Sciences, Alnarp, Fakulteten för landskapsplanering, trädgårds- och jordbruksvetenskap, LTJ, EX0545, Examensarbete för masterexamen på landskapsarkitektprogrammet

Alveblad, C., Jöngren, C., Lindberg S., Persson A., 2013, ”Förorenade odlingsjorlar”, Projektarbete, Institutionen för stad och land, Fakulteten för naturresurser och lantbruksvetenskap, Uppsala

Andersson, K., 2013, “Plant beds for urban farming”, Swedish university of Agricultural Sciences, Alnarp, Fakulteten för landskapsplanering, trädgårds- och jordbruksvetenskap, Institutionen för Landskapsarkitektur, planering och förvaltning, Självständigt arbete/Examensarbete/Kandidatarbete 15 hp

André, H., Jonsson M., 2013, ”INDUSTRIELLT EKOLOGISK STADSODLING - EN KVALITATIV STUDIE SOM UNDERLAG FÖR EN STADSODLINGSREVOLUTION I STOCKHOLM”, KTH, Examensarbete i Energi och miljö, grundnivå

Asp, H., 2009, ”Hållbar utveckling genom stadsodling”, SLU Uppsala, Kandidatarbete vid institutionen för stad och land - avdelningen för Landskapsarkitektur

Barthel, S., Isendahl, C., 2012, “Urban gardens, agriculture, and water management: Sources of resilience for long-term food security in cities”, *Ecological Economics*, 86, 224–234, Elsevier Publications; doi:10.1016/j.ecolecon.2012.06.018

Berg, P., G., Rydén, L., 2012, “Urbanization and Urban-Rural cooperation”, *Ecosystem Health and Sustainable Agriculture*, 3, 141-154, Baltic University Press

Björklund, A., 2010, “Historical urban agriculture – Food production and Access to land in Swedish towns before 1900”, Stockholm university, Doctoral Thesis, Acta universitatis Stockholmiensis, Stockholm studies in Human geography, Universitetservice US-AB, Stockholm 2010

Blake, M., K., Mellor J., Crane L., 2010, “Buying Local Food: Shopping Practices, Place, and Consumption Networks in Defining Food as “Local” ”, *Annals of the Association of American Geographers*, 100(2) pp. 409–426

Blanke, M., M., 2008, "Life Cycle Assessment (LCA) and Food Miles - an Energy Balance for Fruit Imports versus Home-Grown Apples", *Acta Horticulturae*, Proc. XXVII, 767

Brasier, K., J., Goetz, S., Smith L., A., Ames, M., Green, J., Kelsey, T., Rangarajan, A., Whitmer, W., 2007, "Small Farm Clusters and Pathways to Rural Community Sustainability", *Journal of the Community Development Society*, Vol. 38, No.3

Candan, C., 2013, "How can urban policies address urban agriculture", KTH, Department of urban planning and Environment division of Urban and regional studies, Master Degree project in sustainable urban planning

Capozza, D., R., Helsey, R., W 1989, "The Fundamentals of Land Prices and Urban Growth", *Journal of Urban Economics*, 26, 295-306

Cavailhès, J., Wavresky, P., 2003, "Urban influences on periurban farmland prices", *European Review of Agricultural Economics*, Vol 30 (3), pp. 333-357

Chapman, L., 2007, "Transport and climate change: a review", *Journal of Transport Geography*, 15 354–367

Chapman, E., 2010, "Time for change? Permaculture principles in the city", SLU Alnarp, LTJ-fakulteten, Examensarbete för trädgårdsingenjörer

Cromley, R., G., 1982, "The Von Thunen Model and Environmental Uncertainty", *Annals of the Association of American Geographers*, Vol. 72, No. 3 (Sep., 1982), pp.404-410

Dunne, J., B., Chambers K., J., Giombolini K., J., Schlegel S., A., 2010, "What does 'local' mean in the grocery store? Multiplicity in food retailers' perspectives on sourcing and marketing local foods", *Renewable Agriculture and Food Systems*, 26, (1); 46–59

Despommier, D., 2011, "The vertical farm: controlled environment agriculture carried out in tall buildings would create greater food safety and security for large urban populations" *Journal of Consumer Protection and Food sector*, 6:233–236

Eckhardt, L., 2010, "Hållbar växtnäringshantering i Stockholms län - En aktörsanalys", Examensarbete 30 hp, Uppsala University, Teknisk- naturvetenskaplig fakultet UTH-enheten, ISSN: 1650-8319, UPTEC STS10 034

Ekelund, L.; Tjärnemo, H., 2009, "Competitiveness of Local Food Clusters - Supermarket Strategies versus Consumer Preferences for Vegetables in Sweden", *Acta horticulturae*, Issue 831, pp.193-200

Engberg, S., 2012, "Organizing for value creation – A corporate perspective on urban farming", SLU, Department of Economics, Master's thesis, No 757 • ISSN 1401-4084: <http://stud.epsilon.slu.se>

Eriksson, A., 2013, "Growing your neighborhood! Urban cultivation importance, motivations and implementation - a case study of Odlingsnätverket Seved in Malmö.", Swedish university of Agricultural Sciences, Alnarp, LTJ-fakulteten, LU, Institutionen för landskapsarkitektur, planering och förvaltning, Master Project in Landscape Architecture

Griffin, E., 1973, "Testing the Von Thunen Theory in Uruguay", *Geographical Review*, Vol. 63, No. 4, pp. 500-516

Grotewold, 1959, "Von Thunen in Retrospect", *Economic Geography*, Vol. 35, No. 4, pp. 346-355

Gunnarsson, K., 2000, "Urban Farming - Possibilities and constraints", Swedish University of Agricultural Sciences, Alnarp, Institutionen för växtskyddsvetenskap, Examensarbeten inom Hortonomprogrammet

Gustafsson, C., 2012, "Rurbanism - a new social movement in Sweden? – urban agriculture and Baugemeinschaft in the city", Swedish university of Agricultural Sciences, Uppsala, Institutionen för stad och land, Självständigt arbete i landsbygdsutveckling

Götmark, H., 2012, "Experiences of rooftop agriculture - a study in collaboration with Augustenborg Botanical Roof Garden", Swedish University of Agricultural Sciences, Alnarp, Fakulteten för Landskapsplanering, trädgårds- och jordbruksvetenskap, Hortikultur, Kandidatarbete i biologi

Huanga, D., Drescher, M., 2014, "Urban crops and livestock: The experiences, challenges, and opportunities of planning for urban agriculture in two Canadian provinces", *Land Use Policy*, 43, p. 1-14

Hendeberg, L., 2010, "Urban agriculture reclaim the vision of the Garden City", Swedish University of Agricultural Sciences, Alnarp, Fakulteten för Landskapsplanering, trädgårds- och jordbruksvetenskap, Institutionen för landskapsplanering, Examensarbete för trädgårdsingenjörer design

Hofny-Collins, A., H., 2006, "The Potential for Using Composted Municipal Waste in Agriculture: The case of Accra, Ghana", Swedish University of Agricultural Sciences, Uppsala, Faculty of Natural Resources and Agricultural Sciences, Department of Urban and Rural Development, *Acta Universitatis Agriculturae Sueciae*, PhD Thesis

Hörnstein, K., 2010, "Urban Agriculture as a Concept in Sweden – Background, Present Situation and Possible Development of the Future", Swedish University of Agricultural Sciences, Alnarp, Fakulteten för Landskapsplanering, trädgårds- och jordbruksvetenskap, Självständigt arbete vid LTJ-fakulteten, SLU - EX0363 - 10 hp på trädgårdsingenjörprogrammet

Ilbery, B., Maye, D., 2005, "Food supply chains and sustainability: evidence from specialist food producers in the Scottish/English borders", *Land Use Policy*, Vol. 22, pp. 331-44; <http://dx.doi.org/10.1016/j.landusepol.2004.06.002>

Ilbery, B., Maye D., 2006 "Retailing local food in the Scottish–English borders: A supply chain perspective" , *Geoforum*, 37, 352–367

Isendahl, C., 2012, "Agro-urban landscapes: the example of Maya lowland cities", *ANTIQUITY*, 86, 1112–1125; Antiquity Publications Ltd; <http://antiquity.ac.uk/ant/086/ant0861112.htm>

Isendahl, C., Smith M., E., 2012, "Sustainable agrarian urbanism: The low-density cities of the Mayas and Aztecs", *Cities*, 31, 132–143; <http://dx.doi.org/10.1016/j.cities.2012.07.012>

Johansson, G., 2013, "Urban farming in Pocket parks – A design proposal to a pocket park in Limhamn", Swedish University of Agricultural Sciences, Alnarp, Fakulteten för Landskapsplanering, trädgårds- och jordbruksvetenskap, Institutionen för Landskapsarkitektur, planering och förvaltning, Trädgårdsingenjör, Kandidatarbete inom landskapsarkitektur

Jones, A., P., McGuire, W., J. Wittet, A., D., 1978 "A reexamination of some aspects of von thunen's model of spatial location", *Journal of Regional Science*, VOL. 18, NO. 1, p. 1-15

Jones, C., 2014, "Land use planning policies sand market forces: Utopian aspirations thwarted?", *Land Use Policy*, 38, 573–579

Kaneberg, M., 2013, "Urban agriculture with the eyes of the beholder Designing ideas in a perspective of environmental psychology", Swedish University of Agricultural Sciences, Alnarp, Fakulteten för Landskapsplanering, trädgårds- och jordbruksvetenskap, Institutionen för Landskapsarkitektur, planering och förvaltning, Kandidatexamen i Landskapsplanering, Trädgårdsingenjör: design

Kellerman, A., 1978, "Determinants of Rent from Agricultural Land Around Metropolitan Areas", *Geographical Analysis*, vol. 10, no. 1, p. 1-11

Korinek, J., Sourdin, P., 2009, "Clarifying Trade Costs: Maritime Transport and Its Effect on Agricultural Trade", *Applied Economic Perspectives and Policy*, pp. 1–19

Larsson, H-S., 2010, "Use and expression of the allotment garden – design for the exhibition City growth – green blocks at Wanås 2010", Swedish University of Agricultural Sciences, Alnarp, Fakulteten för Landskapsplanering, trädgårds- och jordbruksvetenskap, Institutionen för Landskapsarkitektur, planering och förvaltning, Examensarbete inom Trädgårdsingenjörsprogrammet med inriktning design

Larsson, E., Setterwall, S., 2013, "Stadsodlingens roll i den hållbara staden – En översiktlig rapport", KTH, Avdelningen för industriell ekologi, Examensarbete i Energi och miljö, grundnivå



Liljeström, C., Persson, M., 2014, "Development of Green space in Dar es Salaam, Tanzania", Uppsala, Swedish University of Agricultural Sciences, Faculty of Natural Resources and Agricultural Sciences, Department of Urban and Rural Development, Division of Landscape architecture, Master's Thesis at the Landscape architect programme

Lindholm, A., 2013, "Stadsodling i Statsplaneringen – och dess bidrag till ökad samhälleg hållbarhet", KTH, Institutionen för Samhällsplanering och miljö - Avdelningen för Urbana och regionala studier, Examensarbete inom hållbar planering

Lönnerud, A., 2012, "Facing Peak Oil and Climate Change: A Pragmatic Approach to a Re-localized Food Production System in Uppsala, Sweden", Uppsala University, Department of Earth Sciences, Master Thesis E, in Sustainable Development 30 credits

Löfstedt, C., 2010, Grönstruktur och inglasade uterum –förtätningselement i den hållbara staden, Institutionen för stad och land, Swedish University of Agricultural Sciences, Uppsala Avdelningen för landskapsarkitektur, Kandidatarbete vid Institutionen för stad och land

Lööv, 2010, "Cultivate in the City for People's Well-being – Seved's experiences from the "Barn i Stan" cultivation project", Swedish University of Agricultural Sciences, Alnarp, Fakulteten för Landskapsplanering, trädgårds- och jordbruksvetenskap, Examensarbete i landskapsplanering

Matopoulos A., Vlachopoulou, M., Manthou, V., 2005, *Operational Research. An International Journal*, Vol.5, No. 1, pp.9-19

Mendes, W., Balmer, K., Kaethler, T., Rhoads, A., 2008, "Using Land Inventories to Plan for Urban Agriculture: Experiences From Portland and Vancouver", *Journal of the American Planning Association*, 74:4, 435-449

Mok, H-F., Williamson, V., G., Grove J., R., Burry K., Barker, S. F., Hamilton A., J., 2013, "Strawberry fields forever? Urban agriculture in developed countries: a review", *Agronomy for sustainable development*, 2-36; DOI 10.1007/s13593-013-0156-7

Mougeot, J.,A.,L., 2000, "Urban Agriculture: Definition, Presence, Potentials and Risks, and Policy Challenges", International Development Research Centre (IDRC), Cities Feeding People Series, Report 31

Muto S., 2006, "Estimation of the bid rent function with the usage decision model", *Journal of Urban Economics*, 60, 33–49

Mäki, U., 2004, "Realism and the nature of theory: a lesson from J H von Thunen for economists and geographers", *Environment and Planning*, volume 36, pages 1719 - 1736

Nerlove, M., L., Sadka, E.,1991, "Von Thunen's Model of the Dual Economy", *Journal of Economics*, Vol. 54, No. 2, pp. 97-123

Nilsson, M., Thuring H., 2010, “growforgold.org - A design proposal for creating productive, green space in cities.”, Swedish University of Agricultural Sciences, Uppsala, Fakulteten för naturresurser och lantbruksvetenskap, institutionen för stad och land, Examensarbete för yrkesexamen på landskapsarkitektprogrammet

Parr, J., B., 2013, “Exploring the urban system of von Thünen’s isolated state”, *Papers in Regional Science*, 1-15

Petersson, J., 2010, ”Hållbart jordbruk i en urban kontext: en alternativ jordbruksutveckling på Kuba”, Institutionen för kulturgeografi och ekonomisk geografi, Lunds universitet, kandidatarbete

Peña Díaz, J., 2001, “The integration of Urban and Peri-Urban agriculture in planning policy of Havana: Planning for Urban Sustainability?”, Royal Institute of Technology (KTH), Department of infrastructure and planning, Master Thesis NR 01-169

Plantinga, A., J., Lubowski, R., N., Stavins, R., N., 2002, “The effects of potential land development on agricultural land prices”, *Journal of Urban Economics*, 52, 561–581

Porter, M., E., 1998, “Clusters and the new Economics of Competition”, *Harvard Business review*, November- December, p. 77-89

Porter, M., E., 2000, “Location, Competition, and Economic Development: Local Clusters in a Global Economy”, *Economic Development Quarterly*, 14: 15, p.15-32

Porter, M., 1990, “The Competitive Advantage of Nations”, *Harvard business review*, Mars-April

Queiroz, M., 2009, “Urban Agriculture/Agricultural Urbanity. About city farming, urban and peri-urban agriculture for a less climate stressing and energy consuming food production”, Swedish University of Agricultural Sciences, Uppsala, Institutionen för stad och land, EX0437 Självständigt arbete i landskapsplanering E, 30 hp

Queiroz, M., 2013, ”INSPIRATIONSGUIDE FÖR DIG SOM VILL ODLA I UPPSALA”, Uppsala kommun

Saukko, S., 2013, “Grow the City! Sustainable use of urban natural resources – a case study from the block Rustmästaren”, Swedish University of Agricultural Sciences, Uppsala, Institutionen för stad och land avdelningen för landskapsarkitektur, Examensarbete vid landskapsarkitektprogrammet

Schneider, M., L., Francis C., A., 2005, “Marketing locally produced foods: Consumer and farmer opinions in Washington County”, Nebraska”, *Renewable Agriculture and Food Systems*, 20(4); 252–260, DOI: 10.1079/RAF2005114

Shapiro, D., Pearlmutter, D., Schwartz, M., 2012, “The emergence of rural transport strategies in response to rising fuel costs”, *Energy Policy*, 44, 92–100

Sjöberg, J., 2012, “On encountering: towards a typology of urban meeting-places – The Case of community gardening in Rosengård, Malmö”, Swedish University of Agricultural Sciences, Alnarp, Fakulteten för Landskapsplanering, trädgårds- och jordbruksvetenskap, Självständigt arbete i hållbar stadsutveckling

Specht, K., Siebert R., Hartmann I., Freisinger U., B., Sawicka, M., Werner A., •Thomaier, S., Henckel, D., Walk, H., Dierich, A., 2013, “Urban agriculture of the future: an overview of sustainability aspects of food production in and on buildings”, *Agricultural Human Values* (2014) 31:33–51

Stanley, J., K., D., A., Hensher, Loader, C., 2011, “Road transport and climate change: Stepping off the greenhouse gas”, *Transportation Research*, 45, 1020–1030

Starr, A., Card, A., Benepe, C., Auld, G., Lamm, D., Smith K., Wilken, K., 2003 “Sustaining local agriculture: Barriers and opportunities to direct marketing between farms and restaurants in Colorado”, *Agriculture and Human Values*, 20: 301–321

Statistics Sweden, ”*Statistisk årsbok 2013*”, p. 62-90

Thibert, J., 2012, “Making Local Planning Work for Urban Agriculture in the North American Context: A View from the Ground” *Journal of Planning Education and Research*, 32(3) 349–357

Thilmany, D., Bond, C., A., Bond J., K., 2008, “Going Local: Exploring Consumer Behavior and Motivations for Direct Food”, *American Journal of Agricultural Economics*, Vol. 90, No. 5, pp. 1303-1309

Tighta, M., R., Bristowa, A.,L., Pridmoreb, A., Maya, A.,D., 2005, “What is a sustainable level of CO2 emissions from transport activity in the UK in 2050?”, *Transport Policy*, 12, 235–244

Timmons, D., Wang Q., 2010, “Direct Food Sales in the United States: Evidence from State and County-Level Data”, *Journal of Sustainable Agriculture*, 34:229–240, DOI: 10.1080/10440040903482605

Wilmsmeier, G., Sanchez, R., J., 2009, “The relevance of international transport costs on food prices: Endogenous and exogenous effects”, *Research in Transportation Economics*, 25, 56–66

Waara A., Hedin, D., 2012, “Lönsam energiåtervinning i ett akvaponiskt system”, Luleå tekniska universitet, Institutionen för ekonomi, teknik och samhälle, Teknologie kandidatexamen i Industriell ekonomi

Weatherell, C., Tregear, A., Allinson, J., 2003, "In search of the concerned consumer: UK public perceptions of food, farming and buying local", *Journal of Rural Studies*, 19, 233–244

Wegweiser, C., 2011, "Uppsala Permaculture Park A Feasibility Study Concerning the Establishment of a Public Permaculture Park in Uppsala, Sweden", Uppsala University, Institutionen för geovetenskaper, Master thesis in Sustainable Development

Whittinghill, L., J., \* and Rowe, D., B., 2011, "The role of green roof technology in urban Agriculture", *Renewable Agriculture and Food Systems*: 27(4); 314–322

William-Olsson Heed, E., Knutsson, P., 2012, "Farming in the City: How can urban agriculture be integrated in slum upgrading schemes in Mumbai, India?", KTH, Skolan för arkitektur och samhällsbyggnad (ABE), Samhällsplanering och miljö, Miljöstrategisk analys, Självständigt arbete på avancerad nivå (masterexamen), 20 poäng / 30 hp

Visser, J., Trienekens, J., van Beek, P., 2013, "Opportunities for Local for Local Food Production - A Case in the Dutch Fruit and Vegetables", *International Journal of Food System Dynamics*, 4 (1), 73-87

Zasada, I., 2011, "Multifunctional peri-urban agriculture—A review of societal demands and the provision of goods and services by farming", *Land Use Policy*, 28 (2011) 639– 648

Åsebo, K., Moxnes Jervell, A., Lieblein, G., Svennerud, M., Francis, C., 2007, "Farmer and Consumer Attitudes at Farmers Markets in Norway", *Journal of Sustainable Agriculture*, 30:4, 67-93, DOI: 10.1300/J064v30n04\_06

### **Internet:**

Business Sweden, <http://www.business-sweden.se>, "About Business Sweden", 2014-07-02; <http://www.business-sweden.se/en/about-us/About-Business-Sweden/>

Swedish petroleum and biofuels institute, 2014, [www.spbi.se](http://www.spbi.se), "Utveckling av försäljningspris för bensin, dieselbränsle och etanol", hämtat 2014-12-30; <http://spbi.se/statistik/priser/?gb0=year&kpi0=on&df0=1980-01-01&dt0=2014-12-31&ts0=0>

Tillväxt Trädgård, [www.tillvaxttradgard.se](http://www.tillvaxttradgard.se), "Tillväxt Trädgård", 2014-07-02; <http://tillvaxttradgard.slu.se/gem/default.aspx?p=11>

### **Other sources:**

Dagens Industri Y, 2014, "Krisen i skolan", Nummer 3, 25 Mars – 28 April, sid 25-29

### **Personal messages:**

Elander, Kjell

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Telephone interview, 26/5/2014

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Mail questionnaire, 30/6/2014

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Telephone interview, 6/5/2014

Nilsson, Jenny

Gardner and owner, Dammstorps handelsträdgård AB

Telephone interview, 9/5/2014

Rappne, Bo

CEO, Slottsträdgården i Ulriksdal

Personal meeting, 10/7/14

Sandin, Håkan

Project Manager, Tillväxt Trädgård

Telephone interview, 16/5/2014

Varnauskas, Maria

Manager Business Development Creative Industries

with profile area Food and food equipment, Business Sweden

Personal meeting, 14/5/2014

Würtz, Gunnar

Former CEO, Solbackens handelsträdgård AB

Personal meeting, 23/5/2014

### **Swedish law references**

*ExL* 1-2 kap & 2 kap, § 3

*NJA* 1990 s. 389

*MB*, 1 kap & 3 kap, § 4, 1:a stycket

*PBL*, 4 kap & 4 kap, § 17, 33-34

### **B1:3 Lagförkortningar:**

**ExL:** Expropriationslagen

**PBL:** Plan & Bygglagen

**MB:** Miljöbalken

**NJA:** Rättsfall i hovrätten

## **Appendix 1- Interview questions**

### **General question**

How would you describe your organisation and its function?

### **Main interview questions**

1. What challenges is there to operate a horticultural business in urban environment?
2. What are the economic advantages and disadvantages with urban agriculture?
3. How can the economic advantages with urban agriculture be utilised in a city?
4. How can the closeness to consumers benefit urban agriculture?
5. Which companies/organisations can benefit from urban agriculture and why?
6. What actors/companies can benefit from urban farming and why?
7. What do you think makes it motivated for companies shall invest time and financial resources in urban agriculture?
8. What do you think is required if urban agriculture is ought to be developed into a wider commercial scale in a Swedish big city?
9. What are the main constraints for urban agriculture in Swedish big cities?
10. What challenges do you consider being the biggest challenges for urban gardeners to manage the competition at the local markets in Swedish cities?
11. How can an urban farmer manage the competition and why should you buy locally produce?
12. How do the municipal governments' policies affect your pre-requisites to operate?
13. How can municipal governments support urban agriculture?

## Appendix 2 – Previous Swedish studies about urban agriculture

**Table I,** The table shows that there are few Swedish studies gives any focus on the economic aspects of urban agriculture

<b>Area</b>	<b>Number of studies</b>
Architecture and urban planning	13
Landscape architecture and horticulture	14
Geography and history	4
Business and economics	2
Environment and biology	5
<b>Total:</b>	<b>38</b>

**Table II,** The table shows previous Swedish studies about urban agriculture

<b>Area</b>	<b>Authors and reports</b>
<i>Architecture and urban planning</i>	Peña Díaz, 2001; Asp, 2009; Queiroz, 2009; Chapman, 2010; Eckhardt, 2010; Löfstedt, 2010; Wegweiser, 2011; Barthel & Isendahl, 2012; William-Olsson Heed & Knutsson, 2012; Candan, 2013; Lindholm, 2013; Larsson & Setterwall, 2013; Saukko, 2013
<i>Landscape architecture and horticulture</i>	Hendeberg, 2010; Larsson, 2010; Nilsson, & Thuring, 2010; Ahlström & Kjellberg, 2011; Götmark, 2012; Andersson, 2013; Johansson, 2013; Kaneberg, 2013; Queiroz, 2013; Liljeström, & Persson, 2014 Lööv, 2010; Gustafsson, 2012; Sjöberg, 2012; Eriksson, 2013
<i>Geography and history</i>	Björklund, 2010; Berg & Rydén, 2011; Isendahl, 2012; Isendahl & Smith 2012
<i>Business and economics</i>	Engberg, 2012; Waara & Hedin, 2012
<i>Environment and biology</i>	Gunnarsson, 2000; Hofny-Collins, 2006; Petersson, 2010; Lönnerud, 2012; Alveblad et al., 2013.